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(54) Title: COMPOSITIONS AND METHODS FOR THERAPY AND DIAGNOSIS OF PROSTATE CANCER
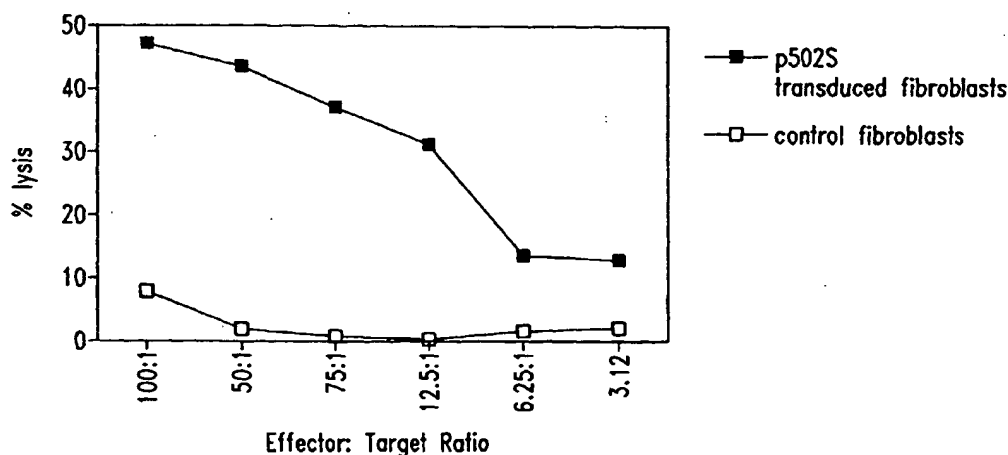
(57) Abstract: Compositions and methods for the therapy and diagnosis of cancer, such as prostate cancer, are disclosed. Compositions may comprise one or more prostate tumor proteins, immunogenic portions thereof, or polynucleotides that encode such portions. Alternatively, a therapeutic composition may comprise an antigen presenting cell that expresses a prostate tumor protein, or a T cell that is specific for cells expressing such a protein. Such compositions may be used, for example, for the prevention and treatment of diseases such as prostate cancer. Diagnostic methods based on detecting a prostate tumor protein, or mRNA encoding such a protein, in a sample are also provided.

WO 01/25272 A2

COMPOSITIONS AND METHODS FOR THERAPY AND
DIAGNOSIS OF PROSTATE CANCER

TECHNICAL FIELD

The present invention relates generally to therapy and diagnosis of cancer, such as prostate cancer. The invention is more specifically related to polypeptides comprising at least a portion of a prostate tumor protein, and to polynucleotides encoding such polypeptides. Such polypeptides and polynucleotides may be used in vaccines and pharmaceutical compositions for prevention and treatment of prostate cancer, and for the diagnosis and monitoring of such cancers.

BACKGROUND OF THE INVENTION

Prostate cancer is the most common form of cancer among males, with an estimated incidence of 30% in men over the age of 50. Overwhelming clinical evidence shows that human prostate cancer has the propensity to metastasize to bone, and the disease appears to progress inevitably from androgen dependent to androgen refractory status, leading to increased patient mortality. This prevalent disease is currently the second leading cause of cancer death among men in the U.S.

In spite of considerable research into therapies for the disease, prostate cancer remains difficult to treat. Commonly, treatment is based on surgery and/or radiation therapy, but these methods are ineffective in a significant percentage of cases. Two previously identified prostate specific proteins - prostate specific antigen (PSA) and prostatic acid phosphatase (PAP) - have limited therapeutic and diagnostic potential. For example, PSA levels do not always correlate well with the presence of prostate cancer, being positive in a percentage of non-prostate cancer cases, including benign prostatic hyperplasia (BPH). Furthermore, PSA measurements correlate with prostate volume, and do not indicate the level of metastasis.

In spite of considerable research into therapies for these and other cancers, prostate cancer remains difficult to diagnose and treat effectively. Accordingly, there is a need in the art for improved methods for detecting and treating

such cancers. The present invention fulfills these needs and further provides other related advantages.

SUMMARY OF THE INVENTION

Briefly stated, the present invention provides compositions and methods for the diagnosis and therapy of cancer, such as prostate cancer. In one aspect, the present invention provides polypeptides comprising at least a portion of a prostate tumor protein, or a variant thereof. Certain portions and other variants are immunogenic, such that the ability of the variant to react with antigen-specific antisera is not substantially diminished. Within certain embodiments, the polypeptide comprises at least an immunogenic portion of a prostate tumor protein, or a variant thereof, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of: (a) sequences recited in any one of SEQ ID NOs:1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472; (b) sequences that hybridize to any of the foregoing sequences under moderately stringent conditions; and (c) complements of any of the sequence of (a) or (b). In certain specific embodiments, such a polypeptide comprises at least a portion, or variant thereof, of a tumor protein that includes an amino acid sequence selected from the group consisting of sequences recited in any one of SEQ ID NO: 112-114, 172, 176, 178, 327, 329, 331, 336, 339, 376-380 and 383.

The present invention further provides polynucleotides that encode a polypeptide as described above, or a portion thereof (such as a portion encoding at least 15 amino acid residues of a prostate tumor protein), expression vectors comprising such polynucleotides and host cells transformed or transfected with such expression vectors.

Within other aspects, the present invention provides pharmaceutical compositions comprising a polypeptide or polynucleotide as described above and a physiologically acceptable carrier.

Within a related aspect of the present invention, vaccines are provided. Such vaccines comprise a polypeptide or polynucleotide as described above and a non-specific immune response enhancer.

The present invention further provides pharmaceutical compositions that comprise: (a) an antibody or antigen-binding fragment thereof that specifically binds to a prostate tumor protein; and (b) a physiologically acceptable carrier.

Within further aspects, the present invention provides pharmaceutical compositions comprising: (a) an antigen presenting cell that expresses a polypeptide as described above and (b) a pharmaceutically acceptable carrier or excipient. Antigen presenting cells include dendritic cells, macrophages, monocytes, fibroblasts and B cells.

Within related aspects, vaccines are provided that comprise: (a) an antigen presenting cell that expresses a polypeptide as described above and (b) a non-specific immune response enhancer.

The present invention further provides, in other aspects, fusion proteins that comprise at least one polypeptide as described above, as well as polynucleotides encoding such fusion proteins.

Within related aspects, pharmaceutical compositions comprising a fusion protein, or a polynucleotide encoding a fusion protein, in combination with a physiologically acceptable carrier are provided.

Vaccines are further provided, within other aspects, that comprise a fusion protein, or a polynucleotide encoding a fusion protein, in combination with a non-specific immune response enhancer.

Within further aspects, the present invention provides methods for inhibiting the development of a cancer in a patient, comprising administering to a patient a pharmaceutical composition or vaccine as recited above.

The present invention further provides, within other aspects, methods for removing tumor cells from a biological sample, comprising contacting a biological sample with T cells that specifically react with a prostate tumor protein, wherein the step of contacting is performed under conditions and for a time sufficient to permit the removal of cells expressing the protein from the sample.

Within related aspects, methods are provided for inhibiting the development of a cancer in a patient, comprising administering to a patient a biological sample treated as described above.

Methods are further provided, within other aspects, for stimulating and/or expanding T cells specific for a prostate tumor protein, comprising contacting T cells with one or more of: (i) a polypeptide as described above; (ii) a polynucleotide encoding such a polypeptide; and/or (iii) an antigen presenting cell that expresses such a polypeptide; under conditions and for a time sufficient to permit the stimulation and/or expansion of T cells. Isolated T cell populations comprising T cells prepared as described above are also provided.

Within further aspects, the present invention provides methods for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of a T cell population as described above.

The present invention further provides methods for inhibiting the development of a cancer in a patient, comprising the steps of: (a) incubating $CD4^+$ and/or $CD8^+$ T cells isolated from a patient with one or more of: (i) a polypeptide comprising at least an immunogenic portion of a prostate tumor protein; (ii) a polynucleotide encoding such a polypeptide; and (iii) an antigen-presenting cell that expressed such a polypeptide; and (b) administering to the patient an effective amount of the proliferated T cells, and thereby inhibiting the development of a cancer in the patient. Proliferated cells may, but need not, be cloned prior to administration to the patient.

Within further aspects, the present invention provides methods for determining the presence or absence of a cancer in a patient, comprising: (a) contacting a biological sample obtained from a patient with a binding agent that binds to a polypeptide as recited above; (b) detecting in the sample an amount of polypeptide that binds to the binding agent; and (c) comparing the amount of polypeptide with a predetermined cut-off value, and therefrom determining the presence or absence of a cancer in the patient. Within preferred embodiments, the binding agent is an antibody, more preferably a monoclonal antibody. The cancer may be prostate cancer.

The present invention also provides, within other aspects, methods for monitoring the progression of a cancer in a patient. Such methods comprise the steps of: (a) contacting a biological sample obtained from a patient at a first point in time with a binding agent that binds to a polypeptide as recited above; (b) detecting in the sample an amount of polypeptide that binds to the binding agent; (c) repeating steps (a) and (b) using a biological sample obtained from the patient at a subsequent point in time; and (d) comparing the amount of polypeptide detected in step (c) with the amount detected in step (b) and therefrom monitoring the progression of the cancer in the patient.

The present invention further provides, within other aspects, methods for determining the presence or absence of a cancer in a patient, comprising the steps of: (a) contacting a biological sample obtained from a patient with an oligonucleotide that hybridizes to a polynucleotide that encodes a prostate tumor protein; (b) detecting in the sample a level of a polynucleotide, preferably mRNA, that hybridizes to the oligonucleotide; and (c) comparing the level of polynucleotide that hybridizes to the oligonucleotide with a predetermined cut-off value, and therefrom determining the presence or absence of a cancer in the patient. Within certain embodiments, the amount of mRNA is detected via polymerase chain reaction using, for example, at least one oligonucleotide primer that hybridizes to a polynucleotide encoding a polypeptide as recited above, or a complement of such a polynucleotide. Within other embodiments, the amount of mRNA is detected using a hybridization technique, employing an oligonucleotide probe that hybridizes to a polynucleotide that encodes a polypeptide as recited above, or a complement of such a polynucleotide.

In related aspects, methods are provided for monitoring the progression of a cancer in a patient, comprising the steps of: (a) contacting a biological sample obtained from a patient with an oligonucleotide that hybridizes to a polynucleotide that encodes a prostate tumor protein; (b) detecting in the sample an amount of a polynucleotide that hybridizes to the oligonucleotide; (c) repeating steps (a) and (b) using a biological sample obtained from the patient at a subsequent point in time; and (d) comparing the amount of polynucleotide detected in step (c) with the amount

detected in step (b) and therefrom monitoring the progression of the cancer in the patient.

Within further aspects, the present invention provides antibodies, such as monoclonal antibodies, that bind to a polypeptide as described above, as well as diagnostic kits comprising such antibodies. Diagnostic kits comprising one or more oligonucleotide probes or primers as described above are also provided.

These and other aspects of the present invention will become apparent upon reference to the following detailed description and attached drawings. All references disclosed herein are hereby incorporated by reference in their entirety as if each was incorporated individually.

BRIEF DESCRIPTION OF THE DRAWINGS AND SEQUENCE IDENTIFIERS

Figure 1 illustrates the ability of T cells to kill fibroblasts expressing the representative prostate tumor polypeptide P502S, as compared to control fibroblasts. The percentage lysis is shown as a series of effector:target ratios, as indicated.

Figures 2A and 2B illustrate the ability of T cells to recognize cells expressing the representative prostate tumor polypeptide P502S. In each case, the number of γ-interferon spots is shown for different numbers of responders. In Figure 2A, data is presented for fibroblasts pulsed with the P2S-12 peptide, as compared to fibroblasts pulsed with a control E75 peptide. In Figure 2B, data is presented for fibroblasts expressing P502S, as compared to fibroblasts expressing HER-2/*neu*.

Figure 3 represents a peptide competition binding assay showing that the P1S#10 peptide, derived from P501S, binds HLA-A2. Peptide P1S#10 inhibits HLA-A2 restricted presentation of fluM58 peptide to CTL clone D150M58 in TNF release bioassay. D150M58 CTL is specific for the HLA-A2 binding influenza matrix peptide fluM58.

Figure 4 illustrates the ability of T cell lines generated from P1S#10 immunized mice to specifically lyse P1S#10-pulsed Jurkat A2Kb targets and P501S-transduced Jurkat A2Kb targets, as compared to EGFP-transduced Jurkat A2Kb. The percent lysis is shown as a series of effector to target ratios, as indicated.

Figure 5 illustrates the ability of a T cell clone to recognize and specifically lyse Jurkat A2Kb cells expressing the representative prostate tumor polypeptide P501S, thereby demonstrating that the P1S#10 peptide may be a naturally processed epitope of the P501S polypeptide.

Figures 6A and 6B are graphs illustrating the specificity of a CD8^{+} cell line (3A-1) for a representative prostate tumor antigen (P501S). Figure 6A shows the results of a ^{51}Cr release assay. The percent specific lysis is shown as a series of effector:target ratios, as indicated. Figure 6B shows the production of interferon-gamma by 3A-1 cells stimulated with autologous B-LCL transduced with P501S, at varying effector:target rations as indicated.

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SEQ ID NO: 2 is the determined 3' cDNA sequence for F1-12

SEQ ID NO: 3 is the determined 5' cDNA sequence for F1-12

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SEQ ID NO: 5 is the determined 3' cDNA sequence for H1-1

SEQ ID NO: 6 is the determined 3' cDNA sequence for H1-9

SEQ ID NO: 7 is the determined 3' cDNA sequence for H1-4

SEQ ID NO: 8 is the determined 3' cDNA sequence for J1-17

SEQ ID NO: 9 is the determined 5' cDNA sequence for J1-17

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SEQ ID NO: 11 is the determined 5' cDNA sequence for L1-12

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SEQ ID NO: 253 is the determined cDNA sequence for JPTPN86

SEQ ID NO: 254 is the determined cDNA sequence for JPTPN87

SEQ ID NO: 255 is the determined cDNA sequence for JPTPN88

SEQ ID NO: 256 is the determined cDNA sequence for JP1F1

SEQ ID NO: 257 is the determined cDNA sequence for JP1F2

SEQ ID NO: 258 is the determined cDNA sequence for JP1C2

SEQ ID NO: 259 is the determined cDNA sequence for JP1B1

SEQ ID NO: 260 is the determined cDNA sequence for JP1B2

SEQ ID NO: 261 is the determined cDNA sequence for JP1D3

SEQ ID NO: 262 is the determined cDNA sequence for JP1A4

SEQ ID NO: 263 is the determined cDNA sequence for JP1F5

SEQ ID NO: 264 is the determined cDNA sequence for JP1E6

SEQ ID NO: 265 is the determined cDNA sequence for JP1D6

SEQ ID NO: 266 is the determined cDNA sequence for JP1B5

SEQ ID NO: 267 is the determined cDNA sequence for JP1A6

SEQ ID NO: 268 is the determined cDNA sequence for JP1E8

SEQ ID NO: 269 is the determined cDNA sequence for JP1D7

SEQ ID NO: 270 is the determined cDNA sequence for JP1D9

SEQ ID NO: 271 is the determined cDNA sequence for JP1C10

SEQ ID NO: 272 is the determined cDNA sequence for JP1A9

SEQ ID NO: 273 is the determined cDNA sequence for JP1F12

SEQ ID NO: 274 is the determined cDNA sequence for JP1E12

SEQ ID NO: 275 is the determined cDNA sequence for JP1D11

SEQ ID NO: 276 is the determined cDNA sequence for JP1C11

SEQ ID NO: 277 is the determined cDNA sequence for JP1C12

SEQ ID NO: 278 is the determined cDNA sequence for JP1B12

SEQ ID NO: 279 is the determined cDNA sequence for JP1A12

SEQ ID NO: 280 is the determined cDNA sequence for JP8G2

SEQ ID NO: 281 is the determined cDNA sequence for JP8H1

SEQ ID NO: 282 is the determined cDNA sequence for JP8H2

SEQ ID NO: 283 is the determined cDNA sequence for JP8A3

SEQ ID NO: 284 is the determined cDNA sequence for JP8A4

SEQ ID NO: 285 is the determined cDNA sequence for JP8C3

SEQ ID NO: 286 is the determined cDNA sequence for JP8G4

SEQ ID NO: 287 is the determined cDNA sequence for JP8B6

SEQ ID NO: 288 is the determined cDNA sequence for JP8D6

SEQ ID NO: 289 is the determined cDNA sequence for JP8F5

SEQ ID NO: 290 is the determined cDNA sequence for JP8A8

SEQ ID NO: 291 is the determined cDNA sequence for JP8C7

SEQ ID NO: 292 is the determined cDNA sequence for JP8D7

SEQ ID NO: 293 is the determined cDNA sequence for P8D8

SEQ ID NO: 294 is the determined cDNA sequence for JP8E7

SEQ ID NO: 295 is the determined cDNA sequence for JP8F8

SEQ ID NO: 296 is the determined cDNA sequence for JP8G8

SEQ ID NO: 297 is the determined cDNA sequence for JP8B10

SEQ ID NO: 298 is the determined cDNA sequence for JP8C10

SEQ ID NO: 299 is the determined cDNA sequence for JP8E9

SEQ ID NO: 300 is the determined cDNA sequence for JP8E10

SEQ ID NO: 301 is the determined cDNA sequence for JP8F9

SEQ ID NO: 302 is the determined cDNA sequence for JP8H9

SEQ ID NO: 303 is the determined cDNA sequence for JP8C12

SEQ ID NO: 304 is the determined cDNA sequence for JP8E11

SEQ ID NO: 305 is the determined cDNA sequence for JP8E12

SEQ ID NO: 306 is the amino acid sequence for the peptide PS2#12

SEQ ID NO: 307 is the determined cDNA sequence for P711P

SEQ ID NO: 308 is the determined cDNA sequence for P712P

SEQ ID NO: 309 is the determined cDNA sequence for CLONE23

SEQ ID NO: 310 is the determined cDNA sequence for P774P

SEQ ID NO: 311 is the determined cDNA sequence for P775P

SEQ ID NO: 312 is the determined cDNA sequence for P715P

SEQ ID NO: 313 is the determined cDNA sequence for P710P

SEQ ID NO: 314 is the determined cDNA sequence for P767P

SEQ ID NO: 315 is the determined cDNA sequence for P768P

SEQ ID NO: 316-325 are the determined cDNA sequences of previously isolated genes

SEQ ID NO: 326 is the determined cDNA sequence for P703PDE5

SEQ ID NO: 327 is the predicted amino acid sequence for P703PDE5

SEQ ID NO: 328 is the determined cDNA sequence for P703P6.26

SEQ ID NO: 329 is the predicted amino acid sequence for P703P6.26

SEQ ID NO: 330 is the determined cDNA sequence for P703PX-23

SEQ ID NO: 331 is the predicted amino acid sequence for P703PX-23

SEQ ID NO: 332 is the determined full length cDNA sequence for P509S

SEQ ID NO: 333 is the determined extended cDNA sequence for P707P (also referred to as 11-C9)

SEQ ID NO: 334 is the determined cDNA sequence for P714P

SEQ ID NO: 335 is the determined cDNA sequence for P705P (also referred to as 9-F3)

SEQ ID NO: 336 is the predicted amino acid sequence for P705P

SEQ ID NO: 337 is the amino acid sequence of the peptide P1S#10

SEQ ID NO: 338 is the amino acid sequence of the peptide p5

SEQ ID NO: 339 is the predicted amino acid sequence of P509S

SEQ ID NO: 340 is the determined cDNA sequence for P778P

SEQ ID NO: 341 is the determined cDNA sequence for P786P

SEQ ID NO: 342 is the determined cDNA sequence for P789P

SEQ ID NO: 343 is the determined cDNA sequence for a clone showing homology to Homo sapiens MM46 mRNA

SEQ ID NO: 344 is the determined cDNA sequence for a clone showing homology to Homo sapiens TNF-alpha stimulated ABC protein (ABC50) mRNA

SEQ ID NO: 345 is the determined cDNA sequence for a clone showing homology to Homo sapiens mRNA for E-cadherin

SEQ ID NO: 346 is the determined cDNA sequence for a clone showing homology to Human nuclear-encoded mitochondrial serine hydroxymethyltransferase (SHMT)

SEQ ID NO: 347 is the determined cDNA sequence for a clone showing homology to Homo sapiens natural resistance-associated macrophage protein2 (NRAMP2)

SEQ ID NO: 348 is the determined cDNA sequence for a clone showing homology to Homo sapiens phosphoglucomutase-related protein (PGMRP)

SEQ ID NO: 349 is the determined cDNA sequence for a clone showing homology to Human mRNA for proteosome subunit p40

SEQ ID NO: 350 is the determined cDNA sequence for P777P

SEQ ID NO: 351 is the determined cDNA sequence for P779P

SEQ ID NO: 352 is the determined cDNA sequence for P790P

SEQ ID NO: 353 is the determined cDNA sequence for P784P

SEQ ID NO: 354 is the determined cDNA sequence for P776P

SEQ ID NO: 355 is the determined cDNA sequence for P780P

SEQ ID NO: 356 is the determined cDNA sequence for P544S

SEQ ID NO: 357 is the determined cDNA sequence for P745S

SEQ ID NO: 358 is the determined cDNA sequence for P782P

SEQ ID NO: 359 is the determined cDNA sequence for P783P

SEQ ID NO: 360 is the determined cDNA sequence for unknown 17984

SEQ ID NO: 361 is the determined cDNA sequence for P787P

SEQ ID NO: 362 is the determined cDNA sequence for P788P

SEQ ID NO: 363 is the determined cDNA sequence for unknown 17994

SEQ ID NO: 364 is the determined cDNA sequence for P781P

SEQ ID NO: 365 is the determined cDNA sequence for P785P

SEQ ID NO: 366-375 are the determined cDNA sequences for splice variants of B305D.

SEQ ID NO: 376 is the predicted amino acid sequence encoded by the sequence of SEQ ID NO: 366.

SEQ ID NO: 377 is the predicted amino acid sequence encoded by the sequence of SEQ ID NO: 372.

SEQ ID NO: 378 is the predicted amino acid sequence encoded by the sequence of SEQ ID NO: 373.

SEQ ID NO: 379 is the predicted amino acid sequence encoded by the sequence of SEQ ID NO: 374.

SEQ ID NO: 380 is the predicted amino acid sequence encoded by the sequence of SEQ ID NO: 375.

SEQ ID NO: 381 is the determined cDNA sequence for B716P.

SEQ ID NO: 382 is the determined full-length cDNA sequence for P711P.

SEQ ID NO: 383 is the predicted amino acid sequence for P711P.

SEQ ID NO: 384 is the cDNA sequence for P1000C.

SEQ ID NO: 385 is the cDNA sequence for CGI-82.

SEQ ID NO:386 is the cDNA sequence for 23320.

SEQ ID NO:387 is the cDNA sequence for CGI-69.

SEQ ID NO:388 is the cDNA sequence for L-iditol-2-dehydrogenase.

SEQ ID NO:389 is the cDNA sequence for 23379.

SEQ ID NO:390 is the cDNA sequence for 23381.

SEQ ID NO:391 is the cDNA sequence for KIAA0122.

SEQ ID NO:392 is the cDNA sequence for 23399.

SEQ ID NO:393 is the cDNA sequence for a previously identified gene.

SEQ ID NO:394 is the cDNA sequence for HCLBP.

SEQ ID NO:395 is the cDNA sequence for transglutaminase.

SEQ ID NO:396 is the cDNA sequence for a previously identified gene.

SEQ ID NO:397 is the cDNA sequence for PAP.

SEQ ID NO:398 is the cDNA sequence for Ets transcription factor PDEF.

SEQ ID NO:399 is the cDNA sequence for hTGR.

SEQ ID NO:400 is the cDNA sequence for KIAA0295.

SEQ ID NO:401 is the cDNA sequence for 22545.

SEQ ID NO:402 is the cDNA sequence for 22547.

SEQ ID NO:403 is the cDNA sequence for 22548.

SEQ ID NO:404 is the cDNA sequence for 22550.

SEQ ID NO:405 is the cDNA sequence for 22551.

SEQ ID NO:406 is the cDNA sequence for 22552.

SEQ ID NO:407 is the cDNA sequence for 22553.

SEQ ID NO:408 is the cDNA sequence for 22558.

SEQ ID NO:409 is the cDNA sequence for 22562.

SEQ ID NO:410 is the cDNA sequence for 22565.

SEQ ID NO:411 is the cDNA sequence for 22567.

SEQ ID NO:412 is the cDNA sequence for 22568.

SEQ ID NO:413 is the cDNA sequence for 22570.

SEQ ID NO:414 is the cDNA sequence for 22571.

SEQ ID NO:415 is the cDNA sequence for 22572.

SEQ ID NO:416 is the cDNA sequence for 22573.

SEQ ID NO:417 is the cDNA sequence for 22573.

SEQ ID NO:418 is the cDNA sequence for 22575.

SEQ ID NO:419 is the cDNA sequence for 22580.

SEQ ID NO:420 is the cDNA sequence for 22581.

SEQ ID NO:421 is the cDNA sequence for 22582.

SEQ ID NO:422 is the cDNA sequence for 22583.

SEQ ID NO:423 is the cDNA sequence for 22584.

SEQ ID NO:424 is the cDNA sequence for 22585.

SEQ ID NO:425 is the cDNA sequence for 22586.

SEQ ID NO:426 is the cDNA sequence for 22587.

SEQ ID NO:427 is the cDNA sequence for 22588.

SEQ ID NO:428 is the cDNA sequence for 22589.

SEQ ID NO:429 is the cDNA sequence for 22590.

SEQ ID NO:430 is the cDNA sequence for 22591.

SEQ ID NO:431 is the cDNA sequence for 22592.

SEQ ID NO:432 is the cDNA sequence for 22593.

SEQ ID NO:433 is the cDNA sequence for 22594.

SEQ ID NO:434 is the cDNA sequence for 22595.

SEQ ID NO:435 is the cDNA sequence for 22596.

SEQ ID NO:436 is the cDNA sequence for 22847.

SEQ ID NO:437 is the cDNA sequence for 22848.

SEQ ID NO:438 is the cDNA sequence for 22849.

SEQ ID NO:439 is the cDNA sequence for 22851.

SEQ ID NO:440 is the cDNA sequence for 22852.

SEQ ID NO:441 is the cDNA sequence for 22853.

SEQ ID NO:442 is the cDNA sequence for 22854.

SEQ ID NO:443 is the cDNA sequence for 22855.

SEQ ID NO:444 is the cDNA sequence for 22856.

SEQ ID NO:445 is the cDNA sequence for 22857.

SEQ ID NO:446 is the cDNA sequence for 23601.

SEQ ID NO:447 is the cDNA sequence for 23602.

SEQ ID NO:448 is the cDNA sequence for 23605.

SEQ ID NO:449 is the cDNA sequence for 23606.

SEQ ID NO:450 is the cDNA sequence for 23612.

SEQ ID NO:451 is the cDNA sequence for 23614.

SEQ ID NO:452 is the cDNA sequence for 23618.

SEQ ID NO:453 is the cDNA sequence for 23622.

SEQ ID NO:454 is the cDNA sequence for folate hydrolase.

SEQ ID NO:455 is the cDNA sequence for LIM protein.

SEQ ID NO:456 is the cDNA sequence for a known gene.

SEQ ID NO:457 is the cDNA sequence for a known gene.

SEQ ID NO:458 is the cDNA sequence for a previously identified gene.

SEQ ID NO:459 is the cDNA sequence for 23045.

SEQ ID NO:460 is the cDNA sequence for 23032.

SEQ ID NO:461 is the cDNA sequence for 23054.

SEQ ID NOs:462-467 are cDNA sequences for known genes.

SEQ ID NOs:468-471 are cDNA sequences for P710P.

SEQ ID NO:472 is a cDNA sequence for P1001C.

SEQ ID NO:473 is the amino acid sequence for PSMA.

SEQ ID NO:474 is the amino acid sequence for PAP.

SEQ ID NO:475 is the amino acid sequence for PSA.

SEQ ID NO:476 is the amino acid sequence for a fusion protein containing PSA, P703P and P501S.

DETAILED DESCRIPTION OF THE INVENTION

As noted above, the present invention is generally directed to compositions and methods for the therapy and diagnosis of cancer, such as prostate cancer. The compositions described herein may include prostate tumor polypeptides, polynucleotides encoding such polypeptides, binding agents such as antibodies, antigen presenting cells (APCs) and/or immune system cells (*e.g.*, T cells). Polypeptides of the present invention generally comprise at least a portion (such as an immunogenic portion) of a prostate tumor protein or a variant thereof. A "prostate tumor protein" is a protein that is expressed in prostate tumor cells at a level that is at least two fold, and preferably at least five fold, greater than the level of expression in a normal tissue, as determined using a representative assay provided herein. Certain prostate tumor proteins are tumor proteins that react detectably (within an immunoassay, such as an ELISA or Western blot) with antisera of a patient afflicted with prostate cancer. Polynucleotides of the subject invention generally comprise a DNA or RNA sequence that encodes all or a portion of such a polypeptide, or that is complementary to such a sequence. Antibodies are generally immune system proteins, or antigen-binding fragments thereof, that are capable of binding to a polypeptide as described above. Antigen presenting cells include dendritic cells, macrophages, monocytes, fibroblasts and B-cells that express a polypeptide as described above. T cells that may be employed within such compositions are generally T cells that are specific for a polypeptide as described above.

The present invention is based on the discovery of human prostate tumor proteins. Sequences of polynucleotides encoding certain tumor proteins, or portions thereof, are provided in SEQ ID NOs:1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472. Sequences of polypeptides comprising at least a portion of a tumor protein are provided in SEQ ID NOs:112-114, 172, 176, 178, 327, 329, 331, 336, 339, 376-380 and 383.

PROSTATE TUMOR PROTEIN POLYNUCLEOTIDES

Any polynucleotide that encodes a prostate tumor protein or a portion or other variant thereof as described herein is encompassed by the present invention. Preferred polynucleotides comprise at least 15 consecutive nucleotides, preferably at least 30 consecutive nucleotides and more preferably at least 45 consecutive nucleotides, that encode a portion of a prostate tumor protein. More preferably, a polynucleotide encodes an immunogenic portion of a prostate tumor protein. Polynucleotides complementary to any such sequences are also encompassed by the present invention. Polynucleotides may be single-stranded (coding or antisense) or double-stranded, and may be DNA (genomic, cDNA or synthetic) or RNA molecules. RNA molecules include HnRNA molecules, which contain introns and correspond to a DNA molecule in a one-to-one manner, and mRNA molecules, which do not contain introns. Additional coding or non-coding sequences may, but need not, be present within a polynucleotide of the present invention, and a polynucleotide may, but need not, be linked to other molecules and/or support materials.

Polynucleotides may comprise a native sequence (*i.e.*, an endogenous sequence that encodes a prostate tumor protein or a portion thereof) or may comprise a variant of such a sequence. Polynucleotide variants may contain one or more substitutions, additions, deletions and/or insertions such that the immunogenicity of the encoded polypeptide is not diminished, relative to a native tumor protein. The effect on the immunogenicity of the encoded polypeptide may generally be assessed as described herein. Variants preferably exhibit at least about 70% identity, more preferably at least about 80% identity and most preferably at least about 90% identity to a polynucleotide sequence that encodes a native prostate tumor protein or a portion thereof.

Two polynucleotide or polypeptide sequences are said to be "identical" if the sequence of nucleotides or amino acids in the two sequences is the same when aligned for maximum correspondence as described below. Comparisons between two sequences are typically performed by comparing the sequences over a comparison window to identify and compare local regions of sequence similarity. A "comparison window" as used herein, refers to a segment of at least about 20 contiguous positions,

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usually 30 to about 75, 40 to about 50, in which a sequence may be compared to a reference sequence of the same number of contiguous positions after the two sequences are optimally aligned.

Optimal alignment of sequences for comparison may be conducted using the Megalign program in the Lasergene suite of bioinformatics software (DNASTAR, Inc., Madison, WI), using default parameters. This program embodies several alignment schemes described in the following references: Dayhoff, M.O. (1978) A model of evolutionary change in proteins – Matrices for detecting distant relationships. In Dayhoff, M.O. (ed.) Atlas of Protein Sequence and Structure, National Biomedical Research Foundation, Washington DC Vol. 5, Suppl. 3, pp. 345-358; Hein J. (1990) Unified Approach to Alignment and Phylogenes pp. 626-645 *Methods in Enzymology* vol. 183, Academic Press, Inc., San Diego, CA; Higgins, D.G. and Sharp, P.M. (1989) *CABIOS* 5:151-153; Myers, E.W. and Muller W. (1988) *CABIOS* 4:11-17; Robinson, E.D. (1971) *Comb. Theor 11*:105; Santou, N. Nes, M. (1987) *Mol. Biol. Evol. 4*:406-425; Sneath, P.H.A. and Sokal, R.R. (1973) *Numerical Taxonomy – the Principles and Practice of Numerical Taxonomy*, Freeman Press, San Francisco, CA; Wilbur, W.J. and Lipman, D.J. (1983) *Proc. Natl. Acad., Sci. USA 80*:726-730.

Preferably, the "percentage of sequence identity" is determined by comparing two optimally aligned sequences over a window of comparison of at least 20 positions, wherein the portion of the polynucleotide or polypeptide sequence in the comparison window may comprise additions or deletions (*i.e.*, gaps) of 20 percent or less, usually 5 to 15 percent, or 10 to 12 percent, as compared to the reference sequences (which does not comprise additions or deletions) for optimal alignment of the two sequences. The percentage is calculated by determining the number of positions at which the identical nucleic acid bases or amino acid residue occurs in both sequences to yield the number of matched positions, dividing the number of matched positions by the total number of positions in the reference sequence (*i.e.*, the window size) and multiplying the results by 100 to yield the percentage of sequence identity.

Variants may also, or alternatively, be substantially homologous to a native gene, or a portion or complement thereof. Such polynucleotide variants are

capable of hybridizing under moderately stringent conditions to a naturally occurring DNA sequence encoding a native prostate tumor protein (or a complementary sequence). Suitable moderately stringent conditions include prewashing in a solution of 5 X SSC, 0.5% SDS, 1.0 mM EDTA (pH 8.0); hybridizing at 50°C-65°C, 5 X SSC, overnight; followed by washing twice at 65°C for 20 minutes with each of 2X, 0.5X and 0.2X SSC containing 0.1% SDS.

It will be appreciated by those of ordinary skill in the art that, as a result of the degeneracy of the genetic code, there are many nucleotide sequences that encode a polypeptide as described herein. Some of these polynucleotides bear minimal homology to the nucleotide sequence of any native gene. Nonetheless, polynucleotides that vary due to differences in codon usage are specifically contemplated by the present invention. Further, alleles of the genes comprising the polynucleotide sequences provided herein are within the scope of the present invention. Alleles are endogenous genes that are altered as a result of one or more mutations, such as deletions, additions and/or substitutions of nucleotides. The resulting mRNA and protein may, but need not, have an altered structure or function. Alleles may be identified using standard techniques (such as hybridization, amplification and/or database sequence comparison).

Polynucleotides may be prepared using any of a variety of techniques. For example, a polynucleotide may be identified, as described in more detail below, by screening a microarray of cDNAs for tumor-associated expression (*i.e.*, expression that is at least five fold greater in a prostate tumor than in normal tissue, as determined using a representative assay provided herein). Such screens may be performed using a Synteni microarray (Palo Alto, CA) according to the manufacturer's instructions (and essentially as described by Schena et al., *Proc. Natl. Acad. Sci. USA 93*:10614-10619, 1996 and Heller et al., *Proc. Natl. Acad. Sci. USA 94*:2150-2155, 1997). Alternatively, polypeptides may be amplified from cDNA prepared from cells expressing the proteins described herein, such as prostate tumor cells. Such polynucleotides may be amplified via polymerase chain reaction (PCR). For this approach, sequence-specific primers may be designed based on the sequences provided herein, and may be purchased or synthesized.

An amplified portion may be used to isolate a full length gene from a suitable library (*e.g.*, a prostate tumor cDNA library) using well known techniques. Within such techniques, a library (cDNA or genomic) is screened using one or more polynucleotide probes or primers suitable for amplification. Preferably, a library is size-selected to include larger molecules. Random primed libraries may also be preferred for identifying 5' and upstream regions of genes. Genomic libraries are preferred for obtaining introns and extending 5' sequences.

For hybridization techniques, a partial sequence may be labeled (*e.g.*, by nick-translation or end-labeling with ^{32}P) using well known techniques. A bacterial or bacteriophage library is then screened by hybridizing filters containing denatured bacterial colonies (or lawns containing phage plaques) with the labeled probe (*see* Sambrook et al., *Molecular Cloning: A Laboratory Manual*, Cold Spring Harbor Laboratories, Cold Spring Harbor, NY, 1989). Hybridizing colonies or plaques are selected and expanded, and the DNA is isolated for further analysis. cDNA clones may be analyzed to determine the amount of additional sequence by, for example, PCR using a primer from the partial sequence and a primer from the vector. Restriction maps and partial sequences may be generated to identify one or more overlapping clones. The complete sequence may then be determined using standard techniques, which may involve generating a series of deletion clones. The resulting overlapping sequences are then assembled into a single contiguous sequence. A full length cDNA molecule can be generated by ligating suitable fragments, using well known techniques.

Alternatively, there are numerous amplification techniques for obtaining a full length coding sequence from a partial cDNA sequence. Within such techniques, amplification is generally performed via PCR. Any of a variety of commercially available kits may be used to perform the amplification step. Primers may be designed using, for example, software well known in the art. Primers are preferably 22-30 nucleotides in length, have a GC content of at least 50% and anneal to the target sequence at temperatures of about 68°C to 72°C. The amplified region may be sequenced as described above, and overlapping sequences assembled into a contiguous sequence.

One such amplification technique is inverse PCR (*see* Triglia et al., *Nucl. Acids Res. 16*:8186, 1988), which uses restriction enzymes to generate a fragment in the known region of the gene. The fragment is then circularized by intramolecular ligation and used as a template for PCR with divergent primers derived from the known region. Within an alternative approach, sequences adjacent to a partial sequence may be retrieved by amplification with a primer to a linker sequence and a primer specific to a known region. The amplified sequences are typically subjected to a second round of amplification with the same linker primer and a second primer specific to the known region. A variation on this procedure, which employs two primers that initiate extension in opposite directions from the known sequence, is described in WO 96/38591. Another such technique is known as "rapid amplification of cDNA ends" or RACE. This technique involves the use of an internal primer and an external primer, which hybridizes to a polyA region or vector sequence, to identify sequences that are 5' and 3' of a known sequence. Additional techniques include capture PCR (Lagerstrom et al., *PCR Methods Applic. 1*:111-19, 1991) and walking PCR (Parker et al., *Nucl. Acids. Res. 19*:3055-60, 1991). Other methods employing amplification may also be employed to obtain a full length cDNA sequence.

In certain instances, it is possible to obtain a full length cDNA sequence by analysis of sequences provided in an expressed sequence tag (EST) database, such as that available from GenBank. Searches for overlapping ESTs may generally be performed using well known programs (*e.g.,* NCBI BLAST searches), and such ESTs may be used to generate a contiguous full length sequence.

Certain nucleic acid sequences of cDNA molecules encoding at least a portion of a prostate tumor protein are provided in SEQ ID NOs:1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472. Isolation of these polynucleotides is described below. Each of these prostate tumor proteins was overexpressed in prostate tumor tissue.

Polynucleotide variants may generally be prepared by any method known in the art, including chemical synthesis by, for example, solid phase phosphoramidite chemical synthesis. Modifications in a polynucleotide sequence may

also be introduced using standard mutagenesis techniques, such as oligonucleotide-directed site-specific mutagenesis (*see* Adelman et al., *DNA 2*:183, 1983). Alternatively, RNA molecules may be generated by *in vitro* or *in vivo* transcription of DNA sequences encoding a prostate tumor protein, or portion thereof, provided that the DNA is incorporated into a vector with a suitable RNA polymerase promoter (such as T7 or SP6). Certain portions may be used to prepare an encoded polypeptide, as described herein. In addition, or alternatively, a portion may be administered to a patient such that the encoded polypeptide is generated *in vivo* (*e.g.*, by transfecting antigen-presenting cells, such as dendritic cells, with a cDNA construct encoding a prostate tumor polypeptide, and administering the transfected cells to the patient).

A portion of a sequence complementary to a coding sequence (*i.e.*, an antisense polynucleotide) may also be used as a probe or to modulate gene expression. cDNA constructs that can be transcribed into antisense RNA may also be introduced into cells of tissues to facilitate the production of antisense RNA. An antisense polynucleotide may be used, as described herein, to inhibit expression of a tumor protein. Antisense technology can be used to control gene expression through triple-helix formation, which compromises the ability of the double helix to open sufficiently for the binding of polymerases, transcription factors or regulatory molecules (*see* Gee et al., *In* Huber and Carr, *Molecular and Immunologic Approaches*, Futura Publishing Co. (Mt. Kisco, NY; 1994)). Alternatively, an antisense molecule may be designed to hybridize with a control region of a gene (*e.g.*, promoter, enhancer or transcription initiation site), and block transcription of the gene; or to block translation by inhibiting binding of a transcript to ribosomes.

A portion of a coding sequence, or of a complementary sequence, may also be designed as a probe or primer to detect gene expression. Probes may be labeled with a variety of reporter groups, such as radionuclides and enzymes, and are preferably at least 10 nucleotides in length, more preferably at least 20 nucleotides in length and still more preferably at least 30 nucleotides in length. Primers, as noted above, are preferably 22-30 nucleotides in length.

Any polynucleotide may be further modified to increase stability *in vivo*. Possible modifications include, but are not limited to, the addition of flanking sequences at the 5' and/or 3' ends; the use of phosphorothioate or 2' O-methyl rather than phosphodiesterase linkages in the backbone; and/or the inclusion of nontraditional bases such as inosine, queosine and wybutosine, as well as acetyl- methyl-, thio- and other modified forms of adenine, cytidine, guanine, thymine and uridine.

Nucleotide sequences as described herein may be joined to a variety of other nucleotide sequences using established recombinant DNA techniques. For example, a polynucleotide may be cloned into any of a variety of cloning vectors, including plasmids, phagemids, lambda phage derivatives and cosmids. Vectors of particular interest include expression vectors, replication vectors, probe generation vectors and sequencing vectors. In general, a vector will contain an origin of replication functional in at least one organism, convenient restriction endonuclease sites and one or more selectable markers. Other elements will depend upon the desired use, and will be apparent to those of ordinary skill in the art.

Within certain embodiments, polynucleotides may be formulated so as to permit entry into a cell of a mammal, and expression therein. Such formulations are particularly useful for therapeutic purposes, as described below. Those of ordinary skill in the art will appreciate that there are many ways to achieve expression of a polynucleotide in a target cell, and any suitable method may be employed. For example, a polynucleotide may be incorporated into a viral vector such as, but not limited to, adenovirus, adeno-associated virus, retrovirus, or vaccinia or other pox virus (*e.g.*, avian pox virus). Techniques for incorporating DNA into such vectors are well known to those of ordinary skill in the art. A retroviral vector may additionally transfer or incorporate a gene for a selectable marker (to aid in the identification or selection of transduced cells) and/or a targeting moiety, such as a gene that encodes a ligand for a receptor on a specific target cell, to render the vector target specific. Targeting may also be accomplished using an antibody, by methods known to those of ordinary skill in the art.

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Other formulations for therapeutic purposes include colloidal dispersion systems, such as macromolecule complexes, nanocapsules, microspheres, beads, and lipid-based systems including oil-in-water emulsions, micelles, mixed micelles, and liposomes. A preferred colloidal system for use as a delivery vehicle *in vitro* and *in vivo* is a liposome (*i.e.*, an artificial membrane vesicle). The preparation and use of such systems is well known in the art.

PROSTATE TUMOR POLYPEPTIDES

Within the context of the present invention, polypeptides may comprise at least an immunogenic portion of a prostate tumor protein or a variant thereof, as described herein. As noted above, a "prostate tumor protein" is a protein that is expressed by prostate tumor cells. Proteins that are prostate tumor proteins also react detectably within an immunoassay (such as an ELISA) with antisera from a patient with prostate cancer. Polypeptides as described herein may be of any length. Additional sequences derived from the native protein and/or heterologous sequences may be present, and such sequences may (but need not) possess further immunogenic or antigenic properties.

An "immunogenic portion," as used herein is a portion of a protein that is recognized (*i.e.*, specifically bound) by a B-cell and/or T-cell surface antigen receptor. Such immunogenic portions generally comprise at least 5 amino acid residues, more preferably at least 10, and still more preferably at least 20 amino acid residues of a prostate tumor protein or a variant thereof. Certain preferred immunogenic portions include peptides in which an N-terminal leader sequence and/or transmembrane domain have been deleted. Other preferred immunogenic portions may contain a small N- and/or C-terminal deletion (*e.g.*, 1-30 amino acids, preferably 5-15 amino acids), relative to the mature protein.

Immunogenic portions may generally be identified using well known techniques, such as those summarized in Paul, *Fundamental Immunology*, 3rd ed., 243-247 (Raven Press, 1993) and references cited therein. Such techniques include screening polypeptides for the ability to react with antigen-specific antibodies, antisera

and/or T-cell lines or clones. As used herein, antisera and antibodies are "antigen-specific" if they specifically bind to an antigen (*i.e.*, they react with the protein in an ELISA or other immunoassay, and do not react detectably with unrelated proteins). Such antisera and antibodies may be prepared as described herein, and using well known techniques. An immunogenic portion of a native prostate tumor protein is a portion that reacts with such antisera and/or T-cells at a level that is not substantially less than the reactivity of the full length polypeptide (*e.g.*, in an ELISA and/or T-cell reactivity assay). Such immunogenic portions may react within such assays at a level that is similar to or greater than the reactivity of the full length polypeptide. Such screens may generally be performed using methods well known to those of ordinary skill in the art, such as those described in Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratory, 1988. For example, a polypeptide may be immobilized on a solid support and contacted with patient sera to allow binding of antibodies within the sera to the immobilized polypeptide. Unbound sera may then be removed and bound antibodies detected using, for example, ^{125}I-labeled Protein A.

As noted above, a composition may comprise a variant of a native prostate tumor protein. A polypeptide "variant," as used herein, is a polypeptide that differs from a native prostate tumor protein in one or more substitutions, deletions, additions and/or insertions, such that the immunogenicity of the polypeptide is not substantially diminished. In other words, the ability of a variant to react with antigen-specific antisera may be enhanced or unchanged, relative to the native protein, or may be diminished by less than 50%, and preferably less than 20%, relative to the native protein. Such variants may generally be identified by modifying one of the above polypeptide sequences and evaluating the reactivity of the modified polypeptide with antigen-specific antibodies or antisera as described herein. Preferred variants include those in which one or more portions, such as an N-terminal leader sequence or transmembrane domain, have been removed. Other preferred variants include variants in which a small portion (*e.g.*, 1-30 amino acids, preferably 5-15 amino acids) has been removed from the N- and/or C-terminal of the mature protein. Polypeptide variants preferably exhibit at least about 70%, more preferably at least about 90% and most

preferably at least about 95% identity (determined as described above) to the identified polypeptides.

Preferably, a variant contains conservative substitutions. A "conservative substitution" is one in which an amino acid is substituted for another amino acid that has similar properties, such that one skilled in the art of peptide chemistry would expect the secondary structure and hydropathic nature of the polypeptide to be substantially unchanged. Amino acid substitutions may generally be made on the basis of similarity in polarity, charge, solubility, hydrophobicity, hydrophilicity and/or the amphipathic nature of the residues. For example, negatively charged amino acids include aspartic acid and glutamic acid; positively charged amino acids include lysine and arginine; and amino acids with uncharged polar head groups having similar hydrophilicity values include leucine, isoleucine and valine; glycine and alanine; asparagine and glutamine; and serine, threonine, phenylalanine and tyrosine. Other groups of amino acids that may represent conservative changes include: (1) ala, pro, gly, glu, asp, gln, asn, ser, thr; (2) cys, ser, tyr, thr; (3) val, ile, leu, met, ala, phe; (4) lys, arg, his; and (5) phe, tyr, trp, his. A variant may also, or alternatively, contain nonconservative changes. In a preferred embodiment, variant polypeptides differ from a native sequence by substitution, deletion or addition of five amino acids or fewer. Variants may also (or alternatively) be modified by, for example, the deletion or addition of amino acids that have minimal influence on the immunogenicity, secondary structure and hydropathic nature of the polypeptide.

As noted above, polypeptides may comprise a signal (or leader) sequence at the N-terminal end of the protein which co-translationally or post-translationally directs transfer of the protein. The polypeptide may also be conjugated to a linker or other sequence for ease of synthesis, purification or identification of the polypeptide (e.g., poly-His), or to enhance binding of the polypeptide to a solid support. For example, a polypeptide may be conjugated to an immunoglobulin Fc region.

Polypeptides may be prepared using any of a variety of well known techniques. Recombinant polypeptides encoded by DNA sequences as described above may be readily prepared from the DNA sequences using any of a variety of expression

vectors known to those of ordinary skill in the art. Expression may be achieved in any appropriate host cell that has been transformed or transfected with an expression vector containing a DNA molecule that encodes a recombinant polypeptide. Suitable host cells include prokaryotes, yeast and higher eukaryotic cells. Preferably, the host cells employed are *E. coli*, yeast or a mammalian cell line such as COS or CHO. Supernatants from suitable host/vector systems which secrete recombinant protein or polypeptide into culture media may be first concentrated using a commercially available filter. Following concentration, the concentrate may be applied to a suitable purification matrix such as an affinity matrix or an ion exchange resin. Finally, one or more reverse phase HPLC steps can be employed to further purify a recombinant polypeptide.

Portions and other variants having fewer than about 100 amino acids, and generally fewer than about 50 amino acids, may also be generated by synthetic means, using techniques well known to those of ordinary skill in the art. For example, such polypeptides may be synthesized using any of the commercially available solid-phase techniques, such as the Merrifield solid-phase synthesis method, where amino acids are sequentially added to a growing amino acid chain. *See* Merrifield, *J. Am. Chem. Soc. 85*:2149-2146, 1963. Equipment for automated synthesis of polypeptides is commercially available from suppliers such as Perkin Elmer/Applied BioSystems Division (Foster City, CA), and may be operated according to the manufacturer's instructions.

Within certain specific embodiments, a polypeptide may be a fusion protein that comprises multiple polypeptides as described herein, or that comprises at least one polypeptide as described herein and an unrelated sequence, such as a known tumor protein. A fusion partner may, for example, assist in providing T helper epitopes (an immunological fusion partner), preferably T helper epitopes recognized by humans, or may assist in expressing the protein (an expression enhancer) at higher yields than the native recombinant protein. Certain preferred fusion partners are both immunological and expression enhancing fusion partners. Other fusion partners may be selected so as to increase the solubility of the protein or to enable the protein to be

targeted to desired intracellular compartments. Still further fusion partners include affinity tags, which facilitate purification of the protein.

In certain embodiments, the present invention provides fusion proteins comprising a polypeptide disclosed herein together with at least one of the following known prostate antigens: prostate specific antigen (PSA); prostatic acid phosphatase (PAP); and prostate specific membrane antigen (PSMA). The protein sequences for PSMA, PAP and PSA are provided in SEQ ID NO: 473-475, respectively. In certain embodiments, the fusion proteins of the present invention comprise PSA, PAP and/or PSMA in combination with one or more of the following the inventive antigens: P501S (amino acid sequence provided in SEQ ID NO: 113); P703P (amino acid sequences provided in SEQ ID NO: 327, 329, 331); P704P (cDNA sequence provided in SEQ ID NO: 67); P712P (cDNA sequence provided in SEQ ID NO: 308); P775P (cDNA sequence provided in SEQ ID NO: 311); P776P (cDNA sequence provided in SEQ ID NO: 354); P790P (cDNA sequence provided in SEQ ID NO: 352). The amino acid sequence of a fusion protein of PSA, P703P and P501S is provided in SEQ ID NO: 476. In preferred embodiments, the inventive fusion proteins comprise one of the following combinations of antigens: PSA and P703P; PSA and P501S; PAP and P703P; PAP and P501S; PSMA and P703P; PSMA and P501S; PSA, PAP and P703P; PSA, PAP and P501S; PSA, PAP, PSMA and P703P, PSA, PAP, PSMA and P501S. One of skill in the art will appreciate that the order of polypeptides within a fusion protein can be altered without substantially changing the therapeutic, prophylactic or diagnostic properties of the fusion protein.

The fusion proteins described above are more immunogenic and will be effective in a greater number of prostate cancer patients than any of the individual components alone. The use of multiple antigens in the form of a fusion protein also lessens the likelihood of immunologic escape.

Fusion proteins may generally be prepared using standard techniques, including chemical conjugation. Preferably, a fusion protein is expressed as a recombinant protein, allowing the production of increased levels, relative to a non-fused protein, in an expression system. Briefly, DNA sequences encoding the polypeptide

components may be assembled separately, and ligated into an appropriate expression vector. The 3' end of the DNA sequence encoding one polypeptide component is ligated, with or without a peptide linker, to the 5' end of a DNA sequence encoding the second polypeptide component so that the reading frames of the sequences are in phase. This permits translation into a single fusion protein that retains the biological activity of both component polypeptides.

A peptide linker sequence may be employed to separate the first and the second polypeptide components by a distance sufficient to ensure that each polypeptide folds into its secondary and tertiary structures. Such a peptide linker sequence is incorporated into the fusion protein using standard techniques well known in the art. Suitable peptide linker sequences may be chosen based on the following factors: (1) their ability to adopt a flexible extended conformation; (2) their inability to adopt a secondary structure that could interact with functional epitopes on the first and second polypeptides; and (3) the lack of hydrophobic or charged residues that might react with the polypeptide functional epitopes. Preferred peptide linker sequences contain Gly, Asn and Ser residues. Other near neutral amino acids, such as Thr and Ala may also be used in the linker sequence. Amino acid sequences which may be usefully employed as linkers include those disclosed in Maratea et al., *Gene 40*:39-46, 1985; Murphy et al., *Proc. Natl. Acad. Sci. USA 83*:8258-8262, 1986; U.S. Patent No. 4,935,233 and U.S. Patent No. 4,751,180. The linker sequence may generally be from 1 to about 50 amino acids in length. Linker sequences are not required when the first and second polypeptides have non-essential N-terminal amino acid regions that can be used to separate the functional domains and prevent steric interference.

The ligated DNA sequences are operably linked to suitable transcriptional or translational regulatory elements. The regulatory elements responsible for expression of DNA are located only 5' to the DNA sequence encoding the first polypeptides. Similarly, stop codons required to end translation and transcription termination signals are only present 3' to the DNA sequence encoding the second polypeptide.

Fusion proteins are also provided that comprise a polypeptide of the present invention together with an unrelated immunogenic protein. Preferably the immunogenic protein is capable of eliciting a recall response. Examples of such proteins include tetanus, tuberculosis and hepatitis proteins (*see*, for example, Stoute et al. *New Engl. J. Med.*, *336*:86-91, 1997).

Within preferred embodiments, an immunological fusion partner is derived from protein D, a surface protein of the gram-negative bacterium Haemophilus influenza B (WO 91/18926). Preferably, a protein D derivative comprises approximately the first third of the protein (*e.g.*, the first N-terminal 100-110 amino acids), and a protein D derivative may be lipidated. Within certain preferred embodiments, the first 109 residues of a Lipoprotein D fusion partner is included on the N-terminus to provide the polypeptide with additional exogenous T-cell epitopes and to increase the expression level in *E. coli* (thus functioning as an expression enhancer). The lipid tail ensures optimal presentation of the antigen to antigen presenting cells. Other fusion partners include the non-structural protein from influenzae virus, NS1 (hemaglutinin). Typically, the N-terminal 81 amino acids are used, although different fragments that include T-helper epitopes may be used.

In another embodiment, the immunological fusion partner is the protein known as LYTA, or a portion thereof (preferably a C-terminal portion). LYTA is derived from *Streptococcus pneumoniae*, which synthesizes an N-acetyl-L-alanine amidase known as amidase LYTA (encoded by the LytA gene; *Gene 43*:265-292, 1986). LYTA is an autolysin that specifically degrades certain bonds in the peptidoglycan backbone. The C-terminal domain of the LYTA protein is responsible for the affinity to the choline or to some choline analogues such as DEAE. This property has been exploited for the development of *E. coli* C-LYTA expressing plasmids useful for expression of fusion proteins. Purification of hybrid proteins containing the C-LYTA fragment at the amino terminus has been described (*see Biotechnology 10*:795-798, 1992). Within a preferred embodiment, a repeat portion of LYTA may be incorporated into a fusion protein. A repeat portion is found in the C-

terminal region starting at residue 178. A particularly preferred repeat portion incorporates residues 188-305.

In general, polypeptides (including fusion proteins) and polynucleotides as described herein are isolated. An "isolated" polypeptide or polynucleotide is one that is removed from its original environment. For example, a naturally-occurring protein is isolated if it is separated from some or all of the coexisting materials in the natural system. Preferably, such polypeptides are at least about 90% pure, more preferably at least about 95% pure and most preferably at least about 99% pure. A polynucleotide is considered to be isolated if, for example, it is cloned into a vector that is not a part of the natural environment.

BINDING AGENTS

The present invention further provides agents, such as antibodies and antigen-binding fragments thereof, that specifically bind to a prostate tumor protein. As used herein, an antibody, or antigen-binding fragment thereof, is said to "specifically bind" to a prostate tumor protein if it reacts at a detectable level (within, for example, an ELISA) with a prostate tumor protein, and does not react detectably with unrelated proteins under similar conditions. As used herein, "binding" refers to a noncovalent association between two separate molecules such that a complex is formed. The ability to bind may be evaluated by, for example, determining a binding constant for the formation of the complex. The binding ·constant is the value obtained when the concentration of the complex is divided by the product of the component concentrations. In general, two compounds are said to "bind," in the context of the present invention, when the binding constant for complex formation exceeds about 10^3 L/mol. The binding constant may be determined using methods well known in the art.

Binding agents may be further capable of differentiating between patients with and without a cancer, such as prostate cancer, using the representative assays provided herein. In other words, antibodies or other binding agents that bind to a prostate tumor protein will generate a signal indicating the presence of a cancer in at least about 20% of patients with the disease, and will generate a negative signal

indicating the absence of the disease in at least about 90% of individuals without the cancer. To determine whether a binding agent satisfies this requirement, biological samples (e.g., blood, sera, urine and/or tumor biopsies) from patients with and without a cancer (as determined using standard clinical tests) may be assayed as described herein for the presence of polypeptides that bind to the binding agent. It will be apparent that a statistically significant number of samples with and without the disease should be assayed. Each binding agent should satisfy the above criteria; however, those of ordinary skill in the art will recognize that binding agents may be used in combination to improve sensitivity.

Any agent that satisfies the above requirements may be a binding agent. For example, a binding agent may be a ribosome, with or without a peptide component, an RNA molecule or a polypeptide. In a preferred embodiment, a binding agent is an antibody or an antigen-binding fragment thereof. Antibodies may be prepared by any of a variety of techniques known to those of ordinary skill in the art. *See, e.g.,* Harlow and Lane, *Antibodies: A Laboratory Manual,* Cold Spring Harbor Laboratory, 1988. In general, antibodies can be produced by cell culture techniques, including the generation of monoclonal antibodies as described herein, or via transfection of antibody genes into suitable bacterial or mammalian cell hosts, in order to allow for the production of recombinant antibodies. In one technique, an immunogen comprising the polypeptide is initially injected into any of a wide variety of mammals (e.g., mice, rats, rabbits, sheep or goats). In this step, the polypeptides of this invention may serve as the immunogen without modification. Alternatively, particularly for relatively short polypeptides, a superior immune response may be elicited if the polypeptide is joined to a carrier protein, such as bovine serum albumin or keyhole limpet hemocyanin. The immunogen is injected into the animal host, preferably according to a predetermined schedule incorporating one or more booster immunizations, and the animals are bled periodically. Polyclonal antibodies specific for the polypeptide may then be purified from such antisera by, for example, affinity chromatography using the polypeptide coupled to a suitable solid support.

Monoclonal antibodies specific for an antigenic polypeptide of interest may be prepared, for example, using the technique of Kohler and Milstein, *Eur. J. Immunol.* 6:511-519, 1976, and improvements thereto. Briefly, these methods involve the preparation of immortal cell lines capable of producing antibodies having the desired specificity (*i.e.*, reactivity with the polypeptide of interest). Such cell lines may be produced, for example, from spleen cells obtained from an animal immunized as described above. The spleen cells are then immortalized by, for example, fusion with a myeloma cell fusion partner, preferably one that is syngeneic with the immunized animal. A variety of fusion techniques may be employed. For example, the spleen cells and myeloma cells may be combined with a nonionic detergent for a few minutes and then plated at low density on a selective medium that supports the growth of hybrid cells, but not myeloma cells. A preferred selection technique uses HAT (hypoxanthine, aminopterin, thymidine) selection. After a sufficient time, usually about 1 to 2 weeks, colonies of hybrids are observed. Single colonies are selected and their culture supernatants tested for binding activity against the polypeptide. Hybridomas having high reactivity and specificity are preferred.

Monoclonal antibodies may be isolated from the supernatants of growing hybridoma colonies. In addition, various techniques may be employed to enhance the yield, such as injection of the hybridoma cell line into the peritoneal cavity of a suitable vertebrate host, such as a mouse. Monoclonal antibodies may then be harvested from the ascites fluid or the blood. Contaminants may be removed from the antibodies by conventional techniques, such as chromatography, gel filtration, precipitation, and extraction. The polypeptides of this invention may be used in the purification process in, for example, an affinity chromatography step.

Within certain embodiments, the use of antigen-binding fragments of antibodies may be preferred. Such fragments include Fab fragments, which may be prepared using standard techniques. Briefly, immunoglobulins may be purified from rabbit serum by affinity chromatography on Protein A bead columns (Harlow and Lane, *Antibodies: A Laboratory Manual*, Cold Spring Harbor Laboratory, 1988) and digested

by papain to yield Fab and Fc fragments. The Fab and Fc fragments may be separated by affinity chromatography on protein A bead columns.

Monoclonal antibodies of the present invention may be coupled to one or more therapeutic agents. Suitable agents in this regard include radionuclides, differentiation inducers, drugs, toxins, and derivatives thereof. Preferred radionuclides include ^{90}Y, ^{123}I, ^{125}I, ^{131}I, ^{186}Re, ^{188}Re, ^{211}At, and ^{212}Bi. Preferred drugs include methotrexate, and pyrimidine and purine analogs. Preferred differentiation inducers include phorbol esters and butyric acid. Preferred toxins include ricin, abrin, diptheria toxin, cholera toxin, gelonin, Pseudomonas exotoxin, Shigella toxin, and pokeweed antiviral protein.

A therapeutic agent may be coupled (e.g., covalently bonded) to a suitable monoclonal antibody either directly or indirectly (e.g., via a linker group). A direct reaction between an agent and an antibody is possible when each possesses a substituent capable of reacting with the other. For example, a nucleophilic group, such as an amino or sulfhydryl group, on one may be capable of reacting with a carbonyl-containing group, such as an anhydride or an acid halide, or with an alkyl group containing a good leaving group (e.g., a halide) on the other.

Alternatively, it may be desirable to couple a therapeutic agent and an antibody via a linker group. A linker group can function as a spacer to distance an antibody from an agent in order to avoid interference with binding capabilities. A linker group can also serve to increase the chemical reactivity of a substituent on an agent or an antibody, and thus increase the coupling efficiency. An increase in chemical reactivity may also facilitate the use of agents, or functional groups on agents, which otherwise would not be possible.

It will be evident to those skilled in the art that a variety of bifunctional or polyfunctional reagents, both homo- and hetero-functional (such as those described in the catalog of the Pierce Chemical Co., Rockford, IL), may be employed as the linker group. Coupling may be effected, for example, through amino groups, carboxyl groups, sulfhydryl groups or oxidized carbohydrate residues. There are numerous references describing such methodology, e.g., U.S. Patent No. 4,671,958, to Rodwell et al.

Where a therapeutic agent is more potent when free from the antibody portion of the immunoconjugates of the present invention, it may be desirable to use a linker group which is cleavable during or upon internalization into a cell. A number of different cleavable linker groups have been described. The mechanisms for the intracellular release of an agent from these linker groups include cleavage by reduction of a disulfide bond (*e.g.*, U.S. Patent No. 4,489,710, to Spitler), by irradiation of a photolabile bond (*e.g.*, U.S. Patent No. 4,625,014, to Senter et al.), by hydrolysis of derivatized amino acid side chains (*e.g.*, U.S. Patent No. 4,638,045, to Kohn et al.), by serum complement-mediated hydrolysis (*e.g.*, U.S. Patent No. 4,671,958, to Rodwell et al.), and acid-catalyzed hydrolysis (*e.g.*, U.S. Patent No. 4,569,789, to Blattler et al.).

It may be desirable to couple more than one agent to an antibody. In one embodiment, multiple molecules of an agent are coupled to one antibody molecule. In another embodiment, more than one type of agent may be coupled to one antibody. Regardless of the particular embodiment, immunoconjugates with more than one agent may be prepared in a variety of ways. For example, more than one agent may be coupled directly to an antibody molecule, or linkers which provide multiple sites for attachment can be used. Alternatively, a carrier can be used.

A carrier may bear the agents in a variety of ways, including covalent bonding either directly or via a linker group. Suitable carriers include proteins such as albumins (*e.g.*, U.S. Patent No. 4,507,234, to Kato et al.), peptides and polysaccharides such as aminodextran (*e.g.*, U.S. Patent No. 4,699,784, to Shih et al.). A carrier may also bear an agent by noncovalent bonding or by encapsulation, such as within a liposome vesicle (*e.g.*, U.S. Patent Nos. 4,429,008 and 4,873,088). Carriers specific for radionuclide agents include radiohalogenated small molecules and chelating compounds. For example, U.S. Patent No. 4,735,792 discloses representative radiohalogenated small molecules and their synthesis. A radionuclide chelate may be formed from chelating compounds that include those containing nitrogen and sulfur atoms as the donor atoms for binding the metal, or metal oxide, radionuclide. For example, U.S. Patent No. 4,673,562, to Davison et al. discloses representative chelating compounds and their synthesis.

A variety of routes of administration for the antibodies and immunoconjugates may be used. Typically, administration will be intravenous, intramuscular, subcutaneous or in the bed of a resected tumor. It will be evident that the precise dose of the antibody/immunoconjugate will vary depending upon the antibody used, the antigen density on the tumor, and the rate of clearance of the antibody.

T CELLS

Immunotherapeutic compositions may also, or alternatively, comprise T cells specific for a prostate tumor protein. Such cells may generally be prepared *in vitro* or *ex vivo*, using standard procedures. For example, T cells may be isolated from bone marrow, peripheral blood, or a fraction of bone marrow or peripheral blood of a patient, using a commercially available cell separation system, such as the CEPRATE™ system, available from CellPro Inc., Bothell WA (*see also* U.S. Patent No. 5,240,856; U.S. Patent No. 5,215,926; WO 89/06280; WO 91/16116 and WO 92/07243). Alternatively, T cells may be derived from related or unrelated humans, non-human mammals, cell lines or cultures.

T cells may be stimulated with a prostate tumor polypeptide, polynucleotide encoding a prostate tumor polypeptide and/or an antigen presenting cell (APC) that expresses such a polypeptide. Such stimulation is performed under conditions and for a time sufficient to permit the generation of T cells that are specific for the polypeptide. Preferably, a prostate tumor polypeptide or polynucleotide is present within a delivery vehicle, such as a microsphere, to facilitate the generation of specific T cells.

T cells are considered to be specific for a prostate tumor polypeptide if the T cells kill target cells coated with the polypeptide or expressing a gene encoding the polypeptide. T cell specificity may be evaluated using any of a variety of standard techniques. For example, within a chromium release assay or proliferation assay, a stimulation index of more than two fold increase in lysis and/or proliferation, compared to negative controls, indicates T cell specificity. Such assays may be performed, for example, as described in Chen et al., *Cancer Res.* *54*:1065-1070, 1994. Alternatively,

detection of the proliferation of T cells may be accomplished by a variety of known techniques. For example, T cell proliferation can be detected by measuring an increased rate of DNA synthesis (*e.g.*, by pulse-labeling cultures of T cells with tritiated thymidine and measuring the amount of tritiated thymidine incorporated into DNA). Contact with a prostate tumor polypeptide (100 ng/ml - 100 µg/ml, preferably 200 ng/ml - 25 µg/ml) for 3 - 7 days should result in at least a two fold increase in proliferation of the T cells. Contact as described above for 2-3 hours should result in activation of the T cells, as measured using standard cytokine assays in which a two fold increase in the level of cytokine release (*e.g.*, TNF or IFN-γ) is indicative of T cell activation (*see* Coligan et al., Current Protocols in Immunology, vol. 1, Wiley Interscience (Greene 1998)). T cells that have been activated in response to a prostate tumor polypeptide, polynucleotide or polypeptide-expressing APC may be CD4$^+$ and/or CD8$^+$. Prostate tumor protein-specific T cells may be expanded using standard techniques. Within preferred embodiments, the T cells are derived from either a patient or a related, or unrelated, donor and are administered to the patient following stimulation and expansion.

For therapeutic purposes, CD4$^+$ or CD8$^+$ T cells that proliferate in response to a prostate tumor polypeptide, polynucleotide or APC can be expanded in number either *in vitro* or *in vivo*. Proliferation of such T cells *in vitro* may be accomplished in a variety of ways. For example, the T cells can be re-exposed to a prostate tumor polypeptide, or a short peptide corresponding to an immunogenic portion of such a polypeptide, with or without the addition of T cell growth factors, such as interleukin-2, and/or stimulator cells that synthesize a prostate tumor polypeptide. Alternatively, one or more T cells that proliferate in the presence of a prostate tumor protein can be expanded in number by cloning. Methods for cloning cells are well known in the art, and include limiting dilution.

PHARMACEUTICAL COMPOSITIONS AND VACCINES

Within certain aspects, polypeptides, polynucleotides, T cells and/or binding agents disclosed herein may be incorporated into pharmaceutical compositions

or immunogenic compositions (*i.e.*, vaccines). Pharmaceutical compositions comprise one or more such compounds and a physiologically acceptable carrier. Vaccines may comprise one or more such compounds and a non-specific immune response enhancer. A non-specific immune response enhancer may be any substance that enhances an immune response to an exogenous antigen. Examples of non-specific immune response enhancers include adjuvants, biodegradable microspheres (*e.g.*, polylactic galactide) and liposomes (into which the compound is incorporated; *see e.g.*, Fullerton, U.S. Patent No. 4,235,877). Vaccine preparation is generally described in, for example, M.F. Powell and M.J. Newman, eds., "Vaccine Design (the subunit and adjuvant approach)," Plenum Press (NY, 1995). Pharmaceutical compositions and vaccines within the scope of the present invention may also contain other compounds, which may be biologically active or inactive. For example, one or more immunogenic portions of other tumor antigens may be present, either incorporated into a fusion polypeptide or as a separate compound, within the composition or vaccine.

A pharmaceutical composition or vaccine may contain DNA encoding one or more of the polypeptides as described above, such that the polypeptide is generated *in situ*. As noted above, the DNA may be present within any of a variety of delivery systems known to those of ordinary skill in the art, including nucleic acid expression systems, bacteria and viral expression systems. Numerous gene delivery techniques are well known in the art, such as those described by Rolland, *Crit. Rev. Therap. Drug Carrier Systems 15*:143-198, 1998, and references cited therein. Appropriate nucleic acid expression systems contain the necessary DNA sequences for expression in the patient (such as a suitable promoter and terminating signal). Bacterial delivery systems involve the administration of a bacterium (such as *Bacillus-Calmette-Guerrin*) that expresses an immunogenic portion of the polypeptide on its cell surface or secretes such an epitope. In a preferred embodiment, the DNA may be introduced using a viral expression system (*e.g.*, vaccinia or other pox virus, retrovirus, or adenovirus), which may involve the use of a non-pathogenic (defective), replication competent virus. Suitable systems are disclosed, for example, in Fisher-Hoch et al., *Proc. Natl. Acad. Sci. USA 86*:317-321, 1989; Flexner et al., *Ann. N.Y. Acad. Sci. 569*:86-103, 1989; Flexner

et al., *Vaccine 8*:17-21, 1990; U.S. Patent Nos. 4,603,112, 4,769,330, and 5,017,487; WO 89/01973; U.S. Patent No. 4,777,127; GB 2,200,651; EP 0,345,242; WO 91/02805; Berkner, *Biotechniques 6*:616-627, 1988; Rosenfeld et al., *Science 252*:431-434, 1991; Kolls et al., *Proc. Natl. Acad. Sci. USA 91*:215-219, 1994; Kass-Eisler et al., *Proc. Natl. Acad. Sci. USA 90*:11498-11502, 1993; Guzman et al., *Circulation 88*:2838-2848, 1993; and Guzman et al., *Cir. Res. 73*:1202-1207, 1993. Techniques for incorporating DNA into such expression systems are well known to those of ordinary skill in the art. The DNA may also be "naked," as described, for example, in Ulmer et al., *Science 259*:1745-1749, 1993 and reviewed by Cohen, *Science 259*:1691-1692, 1993. The uptake of naked DNA may be increased by coating the DNA onto biodegradable beads, which are efficiently transported into the cells.

While any suitable carrier known to those of ordinary skill in the art may be employed in the pharmaceutical compositions of this invention, the type of carrier will vary depending on the mode of administration. Compositions of the present invention may be formulated for any appropriate manner of administration, including for example, topical, oral, nasal, intravenous, intracranial, intraperitoneal, subcutaneous or intramuscular administration. For parenteral administration, such as subcutaneous injection, the carrier preferably comprises water, saline, alcohol, a fat, a wax or a buffer. For oral administration, any of the above carriers or a solid carrier, such as mannitol, lactose, starch, magnesium stearate, sodium saccharine, talcum, cellulose, glucose, sucrose, and magnesium carbonate, may be employed. Biodegradable microspheres (*e.g.*, polylactate polyglycolate) may also be employed as carriers for the pharmaceutical compositions of this invention. Suitable biodegradable microspheres are disclosed, for example, in U.S. Patent Nos. 4,897,268 and 5,075,109.

Such compositions may also comprise buffers (*e.g.*, neutral buffered saline or phosphate buffered saline), carbohydrates (*e.g.*, glucose, mannose, sucrose or dextrans), mannitol, proteins, polypeptides or amino acids such as glycine, antioxidants, chelating agents such as EDTA or glutathione, adjuvants (*e.g.*, aluminum hydroxide) and/or preservatives. Alternatively, compositions of the present invention may be

formulated as a lyophilizate. Compounds may also be encapsulated within liposomes using well known technology.

Any of a variety of non-specific immune response enhancers may be employed in the vaccines of this invention. For example, an adjuvant may be included. Most adjuvants contain a substance designed to protect the antigen from rapid catabolism, such as aluminum hydroxide or mineral oil, and a stimulator of immune responses, such as lipid A, *Bortadella pertussis* or *Mycobacterium tuberculosis* derived proteins. Suitable adjuvants are commercially available as, for example, Freund's Incomplete Adjuvant and Complete Adjuvant (Difco Laboratories, Detroit, MI); Merck Adjuvant 65 (Merck and Company, Inc., Rahway, NJ); aluminum salts such as aluminum hydroxide gel (alum) or aluminum phosphate; salts of calcium, iron or zinc; an insoluble suspension of acylated tyrosine; acylated sugars; cationically or anionically derivatized polysaccharides; polyphosphazenes; biodegradable microspheres; monophosphoryl lipid A and quil A. Cytokines, such as GM-CSF or interleukin-2, -7, or -12, may also be used as adjuvants.

Within the vaccines provided herein, the adjuvant composition is preferably designed to induce an immune response predominantly of the Th1 type. High levels of Th1-type cytokines (*e.g.,* IFN-γ, IL-2 and IL-12) tend to favor the induction of cell mediated immune responses to an administered antigen. In contrast, high levels of Th2-type cytokines (*e.g.,* IL-4, IL-5, IL-6, IL-10 and TNF-β) tend to favor the induction of humoral immune responses. Following application of a vaccine as provided herein, a patient will support an immune response that includes Th1- and Th2-type responses. Within a preferred embodiment, in which a response is predominantly Th1-type, the level of Th1-type cytokines will increase to a greater extent than the level of Th2-type cytokines. The levels of these cytokines may be readily assessed using standard assays. For a review of the families of cytokines, see Mosmann and Coffman, *Ann. Rev. Immunol.* 7:145-173, 1989.

Preferred adjuvants for use in eliciting a predominantly Th1-type response include, for example, a combination of monophosphoryl lipid A, preferably 3-de-O-acylated monophosphoryl lipid A (3D-MPL), together with an aluminum salt.

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MPL adjuvants are available from Ribi ImmunoChem Research Inc. (Hamilton, MT; *see* US Patent Nos. 4,436,727; 4,877,611; 4,866,034 and 4,912,094). CpG-containing oligonucleotides (in which the CpG dinucleotide is unmethylated) also induce a predominantly Th1 response. Such oligonucleotides are well known and are described, for example, in WO 96/02555. Another preferred adjuvant is a saponin, preferably QS21, which may be used alone or in combination with other adjuvants. For example, an enhanced system involves the combination of a monophosphoryl lipid A and saponin derivative, such as the combination of QS21 and 3D-MPL as described in WO 94/00153, or a less reactogenic composition where the QS21 is quenched with cholesterol, as described in WO 96/33739. Other preferred formulations comprises an oil-in-water emulsion and tocopherol. A particularly potent adjuvant formulation involving QS21, 3D-MPL and tocopherol in an oil-in-water emulsion is described in WO 95/17210. Any vaccine provided herein may be prepared using well known methods that result in a combination of antigen, immune response enhancer and a suitable carrier or excipient.

The compositions described herein may be administered as part of a sustained release formulation (*i.e.,* a formulation such as a capsule or sponge that effects a slow release of compound following administration). Such formulations may generally be prepared using well known technology and administered by, for example, oral, rectal or subcutaneous implantation, or by implantation at the desired target site. Sustained-release formulations may contain a polypeptide, polynucleotide or antibody dispersed in a carrier matrix and/or contained within a reservoir surrounded by a rate controlling membrane. Carriers for use within such formulations are biocompatible, and may also be biodegradable; preferably the formulation provides a relatively constant level of active component release. The amount of active compound contained within a sustained release formulation depends upon the site of implantation, the rate and expected duration of release and the nature of the condition to be treated or prevented.

Any of a variety of delivery vehicles may be employed within pharmaceutical compositions and vaccines to facilitate production of an antigen-specific

immune response that targets tumor cells. Delivery vehicles include antigen presenting cells (APCs), such as dendritic cells, macrophages, B cells, monocytes and other cells that may be engineered to be efficient APCs. Such cells may, but need not, be genetically modified to increase the capacity for presenting the antigen, to improve activation and/or maintenance of the T cell response, to have anti-tumor effects *per se* and/or to be immunologically compatible with the receiver (*i.e.*, matched HLA haplotype). APCs may generally be isolated from any of a variety of biological fluids and organs, including tumor and peritumoral tissues, and may be autologous, allogeneic, syngeneic or xenogeneic cells.

Certain preferred embodiments of the present invention use dendritic cells or progenitors thereof as antigen-presenting cells. Dendritic cells are highly potent APCs (Banchereau and Steinman, *Nature 392*:245-251, 1998) and have been shown to be effective as a physiological adjuvant for eliciting prophylactic or therapeutic antitumor immunity (*see* Timmerman and Levy, *Ann. Rev. Med. 50*:507-529, 1999). In general, dendritic cells may be identified based on their typical shape (stellate *in situ*, with marked cytoplasmic processes (dendrites) visible *in vitro*) and based on the lack of differentiation markers of B cells (CD19 and CD20), T cells (CD3), monocytes (CD14) and natural killer cells (CD56), as determined using standard assays. Dendritic cells may, of course, be engineered to express specific cell-surface receptors or ligands that are not commonly found on dendritic cells *in vivo* or *ex vivo*, and such modified dendritic cells are contemplated by the present invention. As an alternative to dendritic cells, secreted vesicles antigen-loaded dendritic cells (called exosomes) may be used within a vaccine (*see* Zitvogel et al., *Nature Med. 4*:594-600, 1998).

Dendritic cells and progenitors may be obtained from peripheral blood, bone marrow, tumor-infiltrating cells, peritumoral tissues-infiltrating cells, lymph nodes, spleen, skin, umbilical cord blood or any other suitable tissue or fluid. For example, dendritic cells may be differentiated *ex vivo* by adding a combination of cytokines such as GM-CSF, IL-4, IL-13 and/or TNFα to cultures of monocytes harvested from peripheral blood. Alternatively, CD34 positive cells harvested from peripheral blood, umbilical cord blood or bone marrow may be differentiated into

dendritic cells by adding to the culture medium combinations of GM-CSF, IL-3, TNFα, CD40 ligand, LPS, flt3 ligand and/or other compound(s) that induce maturation and proliferation of dendritic cells.

Dendritic cells are conveniently categorized as "immature" and "mature" cells, which allows a simple way to discriminate between two well characterized phenotypes. However, this nomenclature should not be construed to exclude all possible intermediate stages of differentiation. Immature dendritic cells are characterized as APC with a high capacity for antigen uptake and processing, which correlates with the high expression of Fcγ receptor, mannose receptor and DEC-205 marker. The mature phenotype is typically characterized by a lower expression of these markers, but a high expression of cell surface molecules responsible for T cell activation such as class I and class II MHC, adhesion molecules (e.g., CD54 and CD11) and costimulatory molecules (e.g., CD40, CD80 and CD86).

APCs may generally be transfected with a polynucleotide encoding a prostate tumor protein (or portion or other variant thereof) such that the prostate tumor polypeptide, or an immunogenic portion thereof, is expressed on the cell surface. Such transfection may take place ex vivo, and a composition or vaccine comprising such transfected cells may then be used for therapeutic purposes, as described herein. Alternatively, a gene delivery vehicle that targets a dendritic or other antigen presenting cell may be administered to a patient, resulting in transfection that occurs in vivo. In vivo and ex vivo transfection of dendritic cells, for example, may generally be performed using any methods known in the art, such as those described in WO 97/24447, or the gene gun approach described by Mahvi et al., Immunology and cell Biology 75:456-460, 1997. Antigen loading of dendritic cells may be achieved by incubating dendritic cells or progenitor cells with the prostate tumor polypeptide, DNA (naked or within a plasmid vector) or RNA; or with antigen-expressing recombinant bacterium or viruses (e.g., vaccinia, fowlpox, adenovirus or lentivirus vectors). Prior to loading, the polypeptide may be covalently conjugated to an immunological partner that provides T cell help (e.g., a carrier molecule). Alternatively, a dendritic cell may be

pulsed with a non-conjugated immunological partner, separately or in the presence of the polypeptide.

CANCER THERAPY

In further aspects of the present invention, the compositions described herein may be used for immunotherapy of cancer, such as prostate cancer. Within such methods, pharmaceutical compositions and vaccines are typically administered to a patient. As used herein, a "patient" refers to any warm-blooded animal, preferably a human. A patient may or may not be afflicted with cancer. Accordingly, the above pharmaceutical compositions and vaccines may be used to prevent the development of a cancer or to treat a patient afflicted with a cancer. A cancer may be diagnosed using criteria generally accepted in the art, including the presence of a malignant tumor. Pharmaceutical compositions and vaccines may be administered either prior to or following surgical removal of primary tumors and/or treatment such as administration of radiotherapy or conventional chemotherapeutic drugs.

Within certain embodiments, immunotherapy may be active immunotherapy, in which treatment relies on the *in vivo* stimulation of the endogenous host immune system to react against tumors with the administration of immune response-modifying agents (such as polypeptides and polynucleotides disclosed herein).

Within other embodiments, immunotherapy may be passive immunotherapy, in which treatment involves the delivery of agents with established tumor-immune reactivity (such as effector cells or antibodies) that can directly or indirectly mediate antitumor effects and does not necessarily depend on an intact host immune system. Examples of effector cells include T cells as discussed above, T lymphocytes (such as CD8$^+$ cytotoxic T lymphocytes and CD4$^+$ T-helper tumor-infiltrating lymphocytes), killer cells (such as Natural Killer cells and lymphokine-activated killer cells), B cells and antigen-presenting cells (such as dendritic cells and macrophages) expressing a polypeptide provided herein. T cell receptors and antibody receptors specific for the polypeptides recited herein may be cloned, expressed and transferred into other vectors or effector cells for adoptive immunotherapy. The

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polypeptides provided herein may also be used to generate antibodies or anti-idiotypic antibodies (as described above and in U.S. Patent No. 4,918,164) for passive immunotherapy.

Effector cells may generally be obtained in sufficient quantities for adoptive immunotherapy by growth *in vitro*, as described herein. Culture conditions for expanding single antigen-specific effector cells to several billion in number with retention of antigen recognition *in vivo* are well known in the art. Such *in vitro* culture conditions typically use intermittent stimulation with antigen, often in the presence of cytokines (such as IL-2) and non-dividing feeder cells. As noted above, immunoreactive polypeptides as provided herein may be used to rapidly expand antigen-specific T cell cultures in order to generate a sufficient number of cells for immunotherapy. In particular, antigen-presenting cells, such as dendritic, macrophage, monocyte, fibroblast or B cells, may be pulsed with immunoreactive polypeptides or transfected with one or more polynucleotides using standard techniques well known in the art. For example, antigen-presenting cells can be transfected with a polynucleotide having a promoter appropriate for increasing expression in a recombinant virus or other expression system. Cultured effector cells for use in therapy must be able to grow and distribute widely, and to survive long term *in vivo*. Studies have shown that cultured effector cells can be induced to grow in vivo and to survive long term in substantial numbers by repeated stimulation with antigen supplemented with IL-2 (*see*, for example, Cheever et al., *Immunological Reviews 157*:177, 1997).

Alternatively, a vector expressing a polypeptide recited herein may be introduced into antigen presenting cells taken from a patient and clonally propagated *ex vivo* for transplant back into the same patient. Transfected cells may be reintroduced into the patient using any means known in the art, preferably in sterile form by intravenous, intracavitary, intraperitoneal or intratumor administration.

Routes and frequency of administration of the therapeutic compositions disclosed herein, as well as dosage, will vary from individual to individual, and may be readily established using standard techniques. In general, the pharmaceutical compositions and vaccines may be administered by injection (*e.g.*, intracutaneous,

intramuscular, intravenous or subcutaneous), intranasally (*e.g.*, by aspiration) or orally. Preferably, between 1 and 10 doses may be administered over a 52 week period. Preferably, 6 doses are administered, at intervals of 1 month, and booster vaccinations may be given periodically thereafter. Alternate protocols may be appropriate for individual patients. A suitable dose is an amount of a compound that, when administered as described above, is capable of promoting an anti-tumor immune response, and is at least 10-50% above the basal (*i.e.*, untreated) level. Such response can be monitored by measuring the anti-tumor antibodies in a patient or by vaccine-dependent generation of cytolytic effector cells capable of killing the patient's tumor cells *in vitro*. Such vaccines should also be capable of causing an immune response that leads to an improved clinical outcome (*e.g.*, more frequent remissions, complete or partial or longer disease-free survival) in vaccinated patients as compared to non-vaccinated patients. In general, for pharmaceutical compositions and vaccines comprising one or more polypeptides, the amount of each polypeptide present in a dose ranges from about 100 µg to 5 mg per kg of host. Suitable dose sizes will vary with the size of the patient, but will typically range from about 0.1 mL to about 5 mL.

In general, an appropriate dosage and treatment regimen provides the active compound(s) in an amount sufficient to provide therapeutic and/or prophylactic benefit. Such a response can be monitored by establishing an improved clinical outcome (*e.g.*, more frequent remissions, complete or partial, or longer disease-free survival) in treated patients as compared to non-treated patients. Increases in preexisting immune responses to a prostate tumor protein generally correlate with an improved clinical outcome. Such immune responses may generally be evaluated using standard proliferation, cytotoxicity or cytokine assays, which may be performed using samples obtained from a patient before and after treatment.

METHODS FOR DETECTING CANCER

In general, a cancer may be detected in a patient based on the presence of one or more prostate tumor proteins and/or polynucleotides encoding such proteins in a biological sample (for example, blood, sera, urine and/or tumor biopsies) obtained from

the patient. In other words, such proteins may be used as markers to indicate the presence or absence of a cancer such as prostate cancer. In addition, such proteins may be useful for the detection of other cancers. The binding agents provided herein generally permit detection of the level of antigen that binds to the agent in the biological sample. Polynucleotide primers and probes may be used to detect the level of mRNA encoding a tumor protein, which is also indicative of the presence or absence of a cancer. In general, a prostate tumor sequence should be present at a level that is at least three fold higher in tumor tissue than in normal tissue

There are a variety of assay formats known to those of ordinary skill in the art for using a binding agent to detect polypeptide markers in a sample. *See, e.g.,* Harlow and Lane, *Antibodies: A Laboratory Manual,* Cold Spring Harbor Laboratory, 1988. In general, the presence or absence of a cancer in a patient may be determined by (a) contacting a biological sample obtained from a patient with a binding agent; (b) detecting in the sample a level of polypeptide that binds to the binding agent; and (c) comparing the level of polypeptide with a predetermined cut-off value.

In a preferred embodiment, the assay involves the use of binding agent immobilized on a solid support to bind to and remove the polypeptide from the remainder of the sample. The bound polypeptide may then be detected using a detection reagent that contains a reporter group and specifically binds to the binding agent/polypeptide complex. Such detection reagents may comprise, for example, a binding agent that specifically binds to the polypeptide or an antibody or other agent that specifically binds to the binding agent, such as an anti-immunoglobulin, protein G, protein A or a lectin. Alternatively, a competitive assay may be utilized, in which a polypeptide is labeled with a reporter group and allowed to bind to the immobilized binding agent after incubation of the binding agent with the sample. The extent to which components of the sample inhibit the binding of the labeled polypeptide to the binding agent is indicative of the reactivity of the sample with the immobilized binding agent. Suitable polypeptides for use within such assays include full length prostate tumor proteins and portions thereof to which the binding agent binds, as described above.

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The solid support may be any material known to those of ordinary skill in the art to which the tumor protein may be attached. For example, the solid support may be a test well in a microtiter plate or a nitrocellulose or other suitable membrane. Alternatively, the support may be a bead or disc, such as glass, fiberglass, latex or a plastic material such as polystyrene or polyvinylchloride. The support may also be a magnetic particle or a fiber optic sensor, such as those disclosed, for example, in U.S. Patent No. 5,359,681. The binding agent may be immobilized on the solid support using a variety of techniques known to those of skill in the art, which are amply described in the patent and scientific literature. In the context of the present invention, the term "immobilization" refers to both noncovalent association, such as adsorption, and covalent attachment (which may be a direct linkage between the agent and functional groups on the support or may be a linkage by way of a cross-linking agent). Immobilization by adsorption to a well in a microtiter plate or to a membrane is preferred. In such cases, adsorption may be achieved by contacting the binding agent, in a suitable buffer, with the solid support for a suitable amount of time. The contact time varies with temperature, but is typically between about 1 hour and about 1 day. In general, contacting a well of a plastic microtiter plate (such as polystyrene or polyvinylchloride) with an amount of binding agent ranging from about 10 ng to about 10 μg, and preferably about 100 ng to about 1 μg, is sufficient to immobilize an adequate amount of binding agent.

Covalent attachment of binding agent to a solid support may generally be achieved by first reacting the support with a bifunctional reagent that will react with both the support and a functional group, such as a hydroxyl or amino group, on the binding agent. For example, the binding agent may be covalently attached to supports having an appropriate polymer coating using benzoquinone or by condensation of an aldehyde group on the support with an amine and an active hydrogen on the binding partner (see, e.g., Pierce Immunotechnology Catalog and Handbook, 1991, at A12-A13).

In certain embodiments, the assay is a two-antibody sandwich assay. This assay may be performed by first contacting an antibody that has been immobilized

on a solid support, commonly the well of a microtiter plate, with the sample, such that polypeptides within the sample are allowed to bind to the immobilized antibody. Unbound sample is then removed from the immobilized polypeptide-antibody complexes and a detection reagent (preferably a second antibody capable of binding to a different site on the polypeptide) containing a reporter group is added. The amount of detection reagent that remains bound to the solid support is then determined using a method appropriate for the specific reporter group.

More specifically, once the antibody is immobilized on the support as described above, the remaining protein binding sites on the support are typically blocked. Any suitable blocking agent known to those of ordinary skill in the art, such as bovine serum albumin or Tween 20™ (Sigma Chemical Co., St. Louis, MO). The immobilized antibody is then incubated with the sample, and polypeptide is allowed to bind to the antibody. The sample may be diluted with a suitable diluent, such as phosphate-buffered saline (PBS) prior to incubation. In general, an appropriate contact time (i.e., incubation time) is a period of time that is sufficient to detect the presence of polypeptide within a sample obtained from an individual with prostate cancer. Preferably, the contact time is sufficient to achieve a level of binding that is at least about 95% of that achieved at equilibrium between bound and unbound polypeptide. Those of ordinary skill in the art will recognize that the time necessary to achieve equilibrium may be readily determined by assaying the level of binding that occurs over a period of time. At room temperature, an incubation time of about 30 minutes is generally sufficient.

Unbound sample may then be removed by washing the solid support with an appropriate buffer, such as PBS containing 0.1% Tween 20™. The second antibody, which contains a reporter group, may then be added to the solid support. Preferred reporter groups include those groups recited above.

The detection reagent is then incubated with the immobilized antibody-polypeptide complex for an amount of time sufficient to detect the bound polypeptide. An appropriate amount of time may generally be determined by assaying the level of binding that occurs over a period of time. Unbound detection reagent is then removed

and bound detection reagent is detected using the reporter group. The method employed for detecting the reporter group depends upon the nature of the reporter group. For radioactive groups, scintillation counting or autoradiographic methods are generally appropriate. Spectroscopic methods may be used to detect dyes, luminescent groups and fluorescent groups. Biotin may be detected using avidin, coupled to a different reporter group (commonly a radioactive or fluorescent group or an enzyme). Enzyme reporter groups may generally be detected by the addition of substrate (generally for a specific period of time), followed by spectroscopic or other analysis of the reaction products.

To determine the presence or absence of a cancer, such as prostate cancer, the signal detected from the reporter group that remains bound to the solid support is generally compared to a signal that corresponds to a predetermined cut-off value. In one preferred embodiment, the cut-off value for the detection of a cancer is the average mean signal obtained when the immobilized antibody is incubated with samples from patients without the cancer. In general, a sample generating a signal that is three standard deviations above the predetermined cut-off value is considered positive for the cancer. In an alternate preferred embodiment, the cut-off value is determined using a Receiver Operator Curve, according to the method of Sackett et al., *Clinical Epidemiology: A Basic Science for Clinical Medicine*, Little Brown and Co., 1985, p. 106-7. Briefly, in this embodiment, the cut-off value may be determined from a plot of pairs of true positive rates (*i.e.*, sensitivity) and false positive rates (100%-specificity) that correspond to each possible cut-off value for the diagnostic test result. The cut-off value on the plot that is the closest to the upper left-hand corner (*i.e.*, the value that encloses the largest area) is the most accurate cut-off value, and a sample generating a signal that is higher than the cut-off value determined by this method may be considered positive. Alternatively, the cut-off value may be shifted to the left along the plot, to minimize the false positive rate, or to the right, to minimize the false negative rate. In general, a sample generating a signal that is higher than the cut-off value determined by this method is considered positive for a cancer.

In a related embodiment, the assay is performed in a flow-through or strip test format, wherein the binding agent is immobilized on a membrane, such as nitrocellulose. In the flow-through test, polypeptides within the sample bind to the immobilized binding agent as the sample passes through the membrane. A second, labeled binding agent then binds to the binding agent-polypeptide complex as a solution containing the second binding agent flows through the membrane. The detection of bound second binding agent may then be performed as described above. In the strip test format, one end of the membrane to which binding agent is bound is immersed in a solution containing the sample. The sample migrates along the membrane through a region containing second binding agent and to the area of immobilized binding agent. Concentration of second binding agent at the area of immobilized antibody indicates the presence of a cancer. Typically, the concentration of second binding agent at that site generates a pattern, such as a line, that can be read visually. The absence of such a pattern indicates a negative result. In general, the amount of binding agent immobilized on the membrane is selected to generate a visually discernible pattern when the biological sample contains a level of polypeptide that would be sufficient to generate a positive signal in the two-antibody sandwich assay, in the format discussed above. Preferred binding agents for use in such assays are antibodies and antigen-binding fragments thereof. Preferably, the amount of antibody immobilized on the membrane ranges from about 25 ng to about 1μg, and more preferably from about 50 ng to about 500 ng. Such tests can typically be performed with a very small amount of biological sample.

Of course, numerous other assay protocols exist that are suitable for use with the tumor proteins or binding agents of the present invention. The above descriptions are intended to be exemplary only. For example, it will be apparent to those of ordinary skill in the art that the above protocols may be readily modified to use prostate tumor polypeptides to detect antibodies that bind to such polypeptides in a biological sample. The detection of such prostate tumor protein specific antibodies may correlate with the presence of a cancer.

A cancer may also, or alternatively, be detected based on the presence of
T cells that specifically react with a prostate tumor protein in a biological sample.
Within certain methods, a biological sample comprising $CD4^+$ and/or $CD8^+$ T cells
isolated from a patient is incubated with a prostate tumor polypeptide, a polynucleotide
encoding such a polypeptide and/or an APC that expresses at least an immunogenic
portion of such a polypeptide, and the presence or absence of specific activation of the
T cells is detected. Suitable biological samples include, but are not limited to, isolated
T cells. For example, T cells may be isolated from a patient by routine techniques (such
as by Ficoll/Hypaque density gradient centrifugation of peripheral blood lymphocytes).
T cells may be incubated *in vitro* for 2-9 days (typically 4 days) at 37°C with prostate
tumor polypeptide (*e.g.*, 5 - 25 µg/ml). It may be desirable to incubate another aliquot
of a T cell sample in the absence of prostate tumor polypeptide to serve as a control.
For $CD4^+$ T cells, activation is preferably detected by evaluating proliferation of the
T cells. For $CD8^+$ T cells, activation is preferably detected by evaluating cytolytic
activity. A level of proliferation that is at least two fold greater and/or a level of
cytolytic activity that is at least 20% greater than in disease-free patients indicates the
presence of a cancer in the patient.

As noted above, a cancer may also, or alternatively, be detected based on
the level of mRNA encoding a prostate tumor protein in a biological sample. For
example, at least two oligonucleotide primers may be employed in a polymerase chain
reaction (PCR) based assay to amplify a portion of a prostate tumor cDNA derived from
a biological sample, wherein at least one of the oligonucleotide primers is specific for
(*i.e.*, hybridizes to) a polynucleotide encoding the prostate tumor protein. The amplified
cDNA is then separated and detected using techniques well known in the art, such as gel
electrophoresis. Similarly, oligonucleotide probes that specifically hybridize to a
polynucleotide encoding a prostate tumor protein may be used in a hybridization assay
to detect the presence of polynucleotide encoding the tumor protein in a biological
sample.

To permit hybridization under assay conditions, oligonucleotide primers
and probes should comprise an oligonucleotide sequence that has at least about 60%,

preferably at least about 75% and more preferably at least about 90%, identity to a portion of a polynucleotide encoding a prostate tumor protein that is at least 10 nucleotides, and preferably at least 20 nucleotides, in length. Preferably, oligonucleotide primers and/or probes will hybridize to a polynucleotide encoding a polypeptide disclosed herein under moderately stringent conditions, as defined above. Oligonucleotide primers and/or probes which may be usefully employed in the diagnostic methods described herein preferably are at least 10-40 nucleotides in length. In a preferred embodiment, the oligonucleotide primers comprise at least 10 contiguous nucleotides, more preferably at least 15 contiguous nucleotides, of a DNA molecule having a sequence recited in SEQ ID NO: 1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375 and 381. Techniques for both PCR based assays and hybridization assays are well known in the art (see, for example, Mullis et al., *Cold Spring Harbor Symp. Quant. Biol.*, *51*:263, 1987; Erlich ed., *PCR Technology*, Stockton Press, NY, 1989).

One preferred assay employs RT-PCR, in which PCR is applied in conjunction with reverse transcription. Typically, RNA is extracted from a biological sample, such as biopsy tissue, and is reverse transcribed to produce cDNA molecules. PCR amplification using at least one specific primer generates a cDNA molecule, which may be separated and visualized using, for example, gel electrophoresis. Amplification may be performed on biological samples taken from a test patient and from an individual who is not afflicted with a cancer. The amplification reaction may be performed on several dilutions of cDNA spanning two orders of magnitude. A two-fold or greater increase in expression in several dilutions of the test patient sample as compared to the same dilutions of the non-cancerous sample is typically considered positive.

In another embodiment, the disclosed compositions may be used as markers for the progression of cancer. In this embodiment, assays as described above for the diagnosis of a cancer may be performed over time, and the change in the level of reactive polypeptide(s) or polynucleotide evaluated. For example, the assays may be performed every 24-72 hours for a period of 6 months to 1 year, and thereafter

performed as needed. In general, a cancer is progressing in those patients in whom the level of polypeptide or polynucleotide detected increases over time. In contrast, the cancer is not progressing when the level of reactive polypeptide or polynucleotide either remains constant or decreases with time.

Certain *in vivo* diagnostic assays may be performed directly on a tumor. One such assay involves contacting tumor cells with a binding agent. The bound binding agent may then be detected directly or indirectly via a reporter group. Such binding agents may also be used in histological applications. Alternatively, polynucleotide probes may be used within such applications.

As noted above, to improve sensitivity, multiple prostate tumor protein markers may be assayed within a given sample. It will be apparent that binding agents specific for different proteins provided herein may be combined within a single assay. Further, multiple primers or probes may be used concurrently. The selection of tumor protein markers may be based on routine experiments to determine combinations that results in optimal sensitivity. In addition, or alternatively, assays for tumor proteins provided herein may be combined with assays for other known tumor antigens.

DIAGNOSTIC KITS

The present invention further provides kits for use within any of the above diagnostic methods. Such kits typically comprise two or more components necessary for performing a diagnostic assay. Components may be compounds, reagents, containers and/or equipment. For example, one container within a kit may contain a monoclonal antibody or fragment thereof that specifically binds to a prostate tumor protein. Such antibodies or fragments may be provided attached to a support material, as described above. One or more additional containers may enclose elements, such as reagents or buffers, to be used in the assay. Such kits may also, or alternatively, contain a detection reagent as described above that contains a reporter group suitable for direct or indirect detection of antibody binding.

Alternatively, a kit may be designed to detect the level of mRNA encoding a prostate tumor protein in a biological sample. Such kits generally comprise

at least one oligonucleotide probe or primer, as described above, that hybridizes to a polynucleotide encoding a prostate tumor protein. Such an oligonucleotide may be used, for example, within a PCR or hybridization assay. Additional components that may be present within such kits include a second oligonucleotide and/or a diagnostic reagent or container to facilitate the detection of a polynucleotide encoding a prostate tumor protein.

The following Examples are offered by way of illustration and not by way   of   .   limitation.

<u>EXAMPLES</u>

EXAMPLE 1

ISOLATION AND CHARACTERIZATION OF PROSTATE TUMOR

POLYPEPTIDES

This Example describes the isolation of certain prostate tumor polypeptides from a prostate tumor cDNA library.

A human prostate tumor cDNA expression library was constructed from prostate tumor poly A^+ RNA using a Superscript Plasmid System for cDNA Synthesis and Plasmid Cloning kit (BRL Life Technologies, Gaithersburg, MD 20897) following the manufacturer's protocol. Specifically, prostate tumor tissues were homogenized with polytron (Kinematica, Switzerland) and total RNA was extracted using Trizol reagent (BRL Life Technologies) as directed by the manufacturer. The poly A^+ RNA was then purified using a Qiagen oligotex spin column mRNA purification kit (Qiagen, Santa Clarita, CA 91355) according to the manufacturer's protocol. First-strand cDNA was synthesized using the NotI/Oligo-dT18 primer. Double-stranded cDNA was synthesized, ligated with EcoRI/BAXI adaptors (Invitrogen, San Diego, CA) and digested with NotI. Following size fractionation with Chroma Spin-1000 columns (Clontech, Palo Alto, CA), the cDNA was ligated into the EcoRI/NotI site of pCDNA3.1 (Invitrogen) and transformed into ElectroMax *E. coli* DH10B cells (BRL Life Technologies) by electroporation.

Using the same procedure, a normal human pancreas cDNA expression library was prepared from a pool of six tissue specimens (Clontech). The cDNA libraries were characterized by determining the number of independent colonies, the percentage of clones that carried insert, the average insert size and by sequence analysis. The prostate tumor library contained 1.64 x 10^7 independent colonies, with 70% of clones having an insert and the average insert size being 1745 base pairs. The normal pancreas cDNA library contained 3.3 x 10^6 independent colonies, with 69% of clones

having inserts and the average insert size being 1120 base pairs. For both libraries, sequence analysis showed that the majority of clones had a full length cDNA sequence and were synthesized from mRNA, with minimal rRNA and mitochondrial DNA contamination.

cDNA library subtraction was performed using the above prostate tumor and normal pancreas cDNA libraries, as described by Hara *et al.* (*Blood,* *84*:189-199, 1994) with some modifications. Specifically, a prostate tumor-specific subtracted cDNA library was generated as follows. Normal pancreas cDNA library (70 µg) was digested with EcoRI, NotI, and SfuI, followed by a filling-in reaction with DNA polymerase Klenow fragment. After phenol-chloroform extraction and ethanol precipitation, the DNA was dissolved in 100 µl of H_2O, heat-denatured and mixed with 100 µl (100 µg) of Photoprobe biotin (Vector Laboratories, Burlingame, CA). As recommended by the manufacturer, the resulting mixture was irradiated with a 270 W sunlamp on ice for 20 minutes. Additional Photoprobe biotin (50 µl) was added and the biotinylation reaction was repeated. After extraction with butanol five times, the DNA was ethanol-precipitated and dissolved in 23 µl H_2O to form the driver DNA.

To form the tracer DNA, 10 µg prostate tumor cDNA library was digested with BamHI and XhoI, phenol chloroform extracted and passed through Chroma spin-400 columns (Clontech). Following ethanol precipitation, the tracer DNA was dissolved in 5 µl H_2O. Tracer DNA was mixed with 15 µl driver DNA and 20 µl of 2 x hybridization buffer (1.5 M NaCl/10 mM EDTA/50 mM HEPES pH 7.5/0.2% sodium dodecyl sulfate), overlaid with mineral oil, and heat-denatured completely. The sample was immediately transferred into a 68 °C water bath and incubated for 20 hours (long hybridization [LH]). The reaction mixture was then subjected to a streptavidin treatment followed by phenol/chloroform extraction. This process was repeated three more times. Subtracted DNA was precipitated, dissolved in 12 µl H_2O, mixed with 8 µl driver DNA and 20 µl of 2 x hybridization buffer, and subjected to a hybridization at 68 °C for 2 hours (short hybridization [SH]). After removal of biotinylated double-stranded DNA, subtracted cDNA was ligated into BamHI/XhoI site of chloramphenicol resistant pBCSK$^+$ (Stratagene, La Jolla, CA 92037) and transformed into ElectroMax *E.*

coli DH10B cells by electroporation to generate a prostate tumor specific subtracted cDNA library (referred to as "prostate subtraction 1").

To analyze the subtracted cDNA library, plasmid DNA was prepared from 100 independent clones, randomly picked from the subtracted prostate tumor specific library and grouped based on insert size. Representative cDNA clones were further characterized by DNA sequencing with a Perkin Elmer/Applied Biosystems Division Automated Sequencer Model 373A (Foster City, CA). Six cDNA clones, hereinafter referred to as F1-13, F1-12, F1-16, H1-1, H1-9 and H1-4, were shown to be abundant in the subtracted prostate-specific cDNA library. The determined 3' and 5' cDNA sequences for F1-12 are provided in SEQ ID NO: 2 and 3, respectively, with determined 3' cDNA sequences for F1-13, F1-16, H1-1, H1-9 and H1-4 being provided in SEQ ID NO: 1 and 4-7, respectively.

The cDNA sequences for the isolated clones were compared to known sequences in the gene bank using the EMBL and GenBank databases (release 96). Four of the prostate tumor cDNA clones, F1-13, F1-16, H1-1, and H1-4, were determined to encode the following previously identified proteins: prostate specific antigen (PSA), human glandular kallikrein, human tumor expression enhanced gene, and mitochondria cytochrome C oxidase subunit II. H1-9 was found to be identical to a previously identified human autonomously replicating sequence. No significant homologies to the cDNA sequence for F1-12 were found.

Subsequent studies led to the isolation of a full-length cDNA sequence for F1-12. This sequence is provided in SEQ ID NO: 107, with the corresponding predicted amino acid sequence being provided in SEQ ID NO: 108.

To clone less abundant prostate tumor specific genes, cDNA library subtraction was performed by subtracting the prostate tumor cDNA library described above with the normal pancreas cDNA library and with the three most abundant genes in the previously subtracted prostate tumor specific cDNA library: human glandular kallikrein, prostate specific antigen (PSA), and mitochondria cytochrome C oxidase subunit II. Specifically, 1 µg each of human glandular kallikrein, PSA and mitochondria cytochrome C oxidase subunit II cDNAs in pCDNA3.1 were added to the

driver DNA and subtraction was performed as described above to provide a second subtracted cDNA library hereinafter referred to as the "subtracted prostate tumor specific cDNA library with spike".

Twenty-two cDNA clones were isolated from the subtracted prostate tumor specific cDNA library with spike. The determined 3' and 5' cDNA sequences for the clones referred to as J1-17, L1-12, N1-1862, J1-13, J1-19, J1-25, J1-24, K1-58, K1-63, L1-4 and L1-14 are provided in SEQ ID NOS: 8-9, 10-11, 12-13, 14-15, 16-17, 18-19, 20-21, 22-23, 24-25, 26-27 and 28-29, respectively. The determined 3' cDNA sequences for the clones referred to as J1-12, J1-16, J1-21, K1-48, K1-55, L1-2, L1-6, N1-1858, N1-1860, N1-1861, N1-1864 are provided in SEQ ID NOS: 30-40, respectively. Comparison of these sequences with those in the gene bank as described above, revealed no significant homologies to three of the five most abundant DNA species, (J1-17, L1-12 and N1-1862; SEQ ID NOS: 8-9, 10-11 and 12-13, respectively). Of the remaining two most abundant species, one (J1-12; SEQ ID NO:30) was found to be identical to the previously identified human pulmonary surfactant-associated protein, and the other (K1-48; SEQ ID NO:33) was determined to have some homology to *R. norvegicus* mRNA for 2-arylpropionyl-CoA epimerase. Of the 17 less abundant cDNA clones isolated from the subtracted prostate tumor specific cDNA library with spike, four (J1-16, K1-55, L1-6 and N1-1864; SEQ ID NOS:31, 34, 36 and 40, respectively) were found to be identical to previously identified sequences, two (J1-21 and N1-1860; SEQ ID NOS: 32 and 38, respectively) were found to show some homology to non-human sequences, and two (L1-2 and N1-1861; SEQ ID NOS: 35 and 39, respectively) were found to show some homology to known human sequences. No significant homologies were found to the polypeptides J1-13, J1-19, J1-24, J1-25, K1-58, K1-63, L1-4, L1-14 (SEQ ID NOS: 14-15, 16-17, 20-21, 18-19, 22-23, 24-25, 26-27, 28-29, respectively).

Subsequent studies led to the isolation of full length cDNA sequences for J1-17, L1-12 and N1-1862 (SEQ ID NOS: 109-111, respectively). The corresponding predicted amino acid sequences are provided in SEQ ID NOS: 112-114. L1-12 is also referred to as P501S.

In a further experiment, four additional clones were identified by subtracting a prostate tumor cDNA library with normal prostate cDNA prepared from a pool of three normal prostate poly A+ RNA (referred to as "prostate subtraction 2"). The determined cDNA sequences for these clones, hereinafter referred to as U1-3064, U1-3065, V1-3692 and 1A-3905, are provided in SEQ ID NO: 69-72, respectively. Comparison of the determined sequences with those in the gene bank revealed no significant homologies to U1-3065.

A second subtraction with spike (referred to as "prostate subtraction spike 2") was performed by subtracting a prostate tumor specific cDNA library with spike with normal pancreas cDNA library and further spiked with PSA, J1-17, pulmonary surfactant-associated protein, mitochondrial DNA, cytochrome c oxidase subunit II, N1-1862, autonomously replicating sequence, L1-12 and tumor expression enhanced gene. Four additional clones, hereinafter referred to as V1-3686, R1-2330, 1B-3976 and V1-3679, were isolated. The determined cDNA sequences for these clones are provided in SEQ ID NO:73-76, respectively. Comparison of these sequences with those in the gene bank revealed no significant homologies to V1-3686 and R1-2330.

Further analysis of the three prostate subtractions described above (prostate subtraction 2, subtracted prostate tumor specific cDNA library with spike, and prostate subtraction spike 2) resulted in the identification of sixteen additional clones, referred to as 1G-4736, 1G-4738, 1G-4741, 1G-4744, 1G-4734, 1H-4774, 1H-4781, 1H-4785, 1H-4787, 1H-4796, 1I-4810, 1I-4811, 1J-4876, 1K-4884 and 1K-4896. The determined cDNA sequences for these clones are provided in SEQ ID NOS: 77-92, respectively. Comparison of these sequences with those in the gene bank as described above, revealed no significant homologies to 1G-4741, 1G-4734, 1I-4807, 1J-4876 and 1K-4896 (SEQ ID NOS: 79, 81, 87, 90 and 92, respectively). Further analysis of the isolated clones led to the determination of extended cDNA sequences for 1G-4736, 1G-4738, 1G-4741, 1G-4744, 1H-4774, 1H-4781, 1H-4785, 1H-4787, 1H-4796, 1I-4807, 1J-4876, 1K-4884 and 1K-4896, provided in SEQ ID NOS: 179-188 and 191-193,

respectively, and to the determination of additional partial cDNA sequences for 1I-4810 and 1I-4811, provided in SEQ ID NOS: 189 and 190, respectively.

Additional studies with prostate subtraction spike 2 resulted in the isolation of three more clones. Their sequences were determined as described above and compared to the most recent GenBank. All three clones were found to have homology to known genes, which are Cysteine-rich protein, KIAA0242, and KIAA0280 (SEQ ID NO: 317, 319, and 320, respectively). Further analysis of these clones by Synteni microarray (Synteni, Palo Alto, CA) demonstrated that all three clones were over-expressed in most prostate tumors and prostate BPH, as well as in the majority of normal prostate tissues tested, but low expression in all other normal tissues.

An additional subtraction was performed by subtracting a normal prostate cDNA library with normal pancreas cDNA (referred to as "prostate subtraction 3"). This led to the identification of six additional clones referred to as 1G-4761, 1G-4762, 1H-4766, 1H-4770, 1H-4771 and 1H-4772 (SEQ ID NOS: 93-98). Comparison of these sequences with those in the gene bank revealed no significant homologies to 1G-4761 and 1H-4771 (SEQ ID NOS: 93 and 97, respectively). Further analysis of the isolated clones led to the determination of extended cDNA sequences for 1G-4761, 1G-4762, 1H-4766 and 1H-4772 provided in SEQ ID NOS: 194-196 and 199, respectively, and to the determination of additional partial cDNA sequences for 1H-4770 and 1H-4771, provided in SEQ ID NOS: 197 and 198, respectively.

Subtraction of a prostate tumor cDNA library, prepared from a pool of polyA+ RNA from three prostate cancer patients, with a normal pancreas cDNA library (prostate subtraction 4) led to the identification of eight clones, referred to as 1D-4297, 1D-4309, 1D.1-4278, 1D-4288, 1D-4283, 1D-4304, 1D-4296 and 1D-4280 (SEQ ID NOS: 99-107). These sequences were compared to those in the gene bank as described above. No significant homologies were found to 1D-4283 and 1D-4304 (SEQ ID NOS: 103 and 104, respectively). Further analysis of the isolated clones led to the determination of extended cDNA sequences for 1D-4309, 1D.1-4278, 1D-4288, 1D-4283, 1D-4304, 1D-4296 and 1D-4280, provided in SEQ ID NOS: 200-206, respectively.

cDNA clones isolated in prostate subtraction 1 and prostate subtraction 2, described above, were colony PCR amplified and their mRNA expression levels in prostate tumor, normal prostate and in various other normal tissues were determined using microarray technology (Synteni, Palo Alto, CA). Briefly, the PCR amplification products were dotted onto slides in an array format, with each product occupying a unique location in the array. mRNA was extracted from the tissue sample to be tested, reverse transcribed, and fluorescent-labeled cDNA probes were generated. The microarrays were probed with the labeled cDNA probes, the slides scanned and fluorescence intensity was measured. This intensity correlates with the hybridization intensity. Two clones (referred to as P509S and P510S) were found to be over-expressed in prostate tumor and normal prostate and expressed at low levels in all other normal tissues tested (liver, pancreas, skin, bone marrow, brain, breast, adrenal gland, bladder, testes, salivary gland, large intestine, kidney, ovary, lung, spinal cord, skeletal muscle and colon). The determined cDNA sequences for P509S and P510S are provided in SEQ ID NO: 223 and 224, respectively. Comparison of these sequences with those in the gene bank as described above, revealed some homology to previously identified ESTs.

Additional, studies led to the isolation of the full-length cDNA sequence for P509S. This sequence is provided in SEQ ID NO: 332, with the corresponding predicted amino acid sequence being provided in SEQ ID NO: 339.

EXAMPLE 2

DETERMINATION OF TISSUE SPECIFICITY OF PROSTATE TUMOR
POLYPEPTIDES

Using gene specific primers, mRNA expression levels for the representative prostate tumor polypeptides F1-16, H1-1, J1-17 (also referred to as P502S), L1-12 (also referred to as P501S), F1-12 (also referred to as P504S) and N1-1862 (also referred to as P503S) were examined in a variety of normal and tumor tissues using RT-PCR.

Briefly, total RNA was extracted from a variety of normal and tumor tissues using Trizol reagent as described above. First strand synthesis was carried out using 1-2 μg of total RNA with SuperScript II reverse transcriptase (BRL Life Technologies) at 42 °C for one hour. The cDNA was then amplified by PCR with gene-specific primers. To ensure the semi-quantitative nature of the RT-PCR, β-actin was used as an internal control for each of the tissues examined. First, serial dilutions of the first strand cDNAs were prepared and RT-PCR assays were performed using β-actin specific primers. A dilution was then chosen that enabled the linear range amplification of the β-actin template and which was sensitive enough to reflect the differences in the initial copy numbers. Using these conditions, the β-actin levels were determined for each reverse transcription reaction from each tissue. DNA contamination was minimized by DNase treatment and by assuring a negative PCR result when using first strand cDNA that was prepared without adding reverse transcriptase.

mRNA Expression levels were examined in four different types of tumor tissue (prostate tumor from 2 patients, breast tumor from 3 patients, colon tumor, lung tumor), and sixteen different normal tissues, including prostate, colon, kidney, liver, lung, ovary, pancreas, skeletal muscle, skin, stomach, testes, bone marrow and brain. F1-16 was found to be expressed at high levels in prostate tumor tissue, colon tumor and normal prostate, and at lower levels in normal liver, skin and testes, with expression being undetectable in the other tissues examined. H1-1 was found to be expressed at high levels in prostate tumor, lung tumor, breast tumor, normal prostate, normal colon and normal brain, at much lower levels in normal lung, pancreas, skeletal muscle, skin, small intestine, bone marrow, and was not detected in the other tissues tested. J1-17 (P502S) and L1-12 (P501S) appear to be specifically over-expressed in prostate, with both genes being expressed at high levels in prostate tumor and normal prostate but at low to undetectable levels in all the other tissues examined. N1-1862 (P503S) was found to be over-expressed in 60% of prostate tumors and detectable in normal colon and kidney. The RT-PCR results thus indicate that F1-16, H1-1, J1-17 (P502S), N1-1862 (P503S) and L1-12 (P501S) are either prostate specific or are expressed at significantly elevated levels in prostate.

Further RT-PCR studies showed that F1-12 (P504S) is over-expressed in 60% of prostate tumors, detectable in normal kidney but not detectable in all other tissues tested. Similarly, R1-2330 was shown to be over-expressed in 40% of prostate tumors, detectable in normal kidney and liver, but not detectable in all other tissues tested. U1-3064 was found to be over-expressed in 60% of prostate tumors, and also expressed in breast and colon tumors, but was not detectable in normal tissues.

RT-PCR characterization of R1-2330, U1-3064 and 1D-4279 showed that these three antigens are over-expressed in prostate and/or prostate tumors.

Northern analysis with four prostate tumors, two normal prostate samples, two BPH prostates, and normal colon, kidney, liver, lung, pancrease, skeletal muscle, brain, stomach, testes, small intestine and bone marrow, showed that L1-12 (P501S) is over-expressed in prostate tumors and normal prostate, while being undetectable in other normal tissues tested. J1-17 (P502S) was detected in two prostate tumors and not in the other tissues tested. N1-1862 (P503S) was found to be over-expressed in three prostate tumors and to be expressed in normal prostate, colon and kidney, but not in other tissues tested. F1-12 (P504S) was found to be highly expressed in two prostate tumors and to be undetectable in all other tissues tested.

The microarray technology described above was used to determine the expression levels of representative antigens described herein in prostate tumor, breast tumor and the following normal tissues: prostate, liver, pancreas, skin, bone marrow, brain, breast, adrenal gland, bladder, testes, salivary gland, large intestine, kidney, ovary, lung, spinal cord, skeletal muscle and colon. L1-12 (P501S) was found to be over-expressed in normal prostate and prostate tumor, with some expression being detected in normal skeletal muscle. Both J1-12 and F1-12 (P504S) were found to be over-expressed in prostate tumor, with expression being lower or undetectable in all other tissues tested. N1-1862 (P503S) was found to be expressed at high levels in prostate tumor and normal prostate, and at low levels in normal large intestine and normal colon, with expression being undetectable in all other tissues tested. R1-2330 was found to be over-expressed in prostate tumor and normal prostate, and to be expressed at lower levels in all other tissues tested. 1D-4279 was found to be over-

expressed in prostate tumor and normal prostate, expressed at lower levels in normal spinal cord, and to be undetectable in all other tissues tested.

Further microarray analysis to specifically address the extent to which P501S (SEQ ID NO: 110) was expressed in breast tumor revealed moderate over-expression not only in breast tumor, but also in metastatic breast tumor (2/31), with negligible to low expression in normal tissues. This data suggests that P501S may be over-expressed in various breast tumors as well as in prostate tumors.

The expression levels of 32 ESTs (expressed sequence tags) described by Vasmatzis *et al.* (*Proc. Natl. Acad. Sci. USA* *95*:300-304, 1998) in a variety of tumor and normal tissues were examined by microarray technology as described above. Two of these clones (referred to as P1000C and P1001C) were found to be over-expressed in prostate tumor and normal prostate, and expressed at low to undetectable levels in all other tissues tested (normal aorta, thymus, resting and activated PBMC, epithelial cells, spinal cord, adrenal gland, fetal tissues, skin, salivary gland, large intestine, bone marrow, liver, lung, dendritic cells, stomach, lymph nodes, brain, heart, small intestine, skeletal muscle, colon and kidney. The determined cDNA sequences for P1000C and P1001C are provided in SEQ ID NO: 384 and 472, respectively. The sequence of P1001C was found to show some homology to the previously isolated Human mRNA for JM27 protein. No significant homologies were found to the sequence of P1000C.

The expression of the polypeptide encoded by the full length cDNA sequence for F1-12 (also referred to as P504S; SEQ ID NO: 108) was investigated by immunohistochemical analysis. Rabbit-anti-P504S polyclonal antibodies were generated against the full length P504S protein by standard techniques. Subsequent isolation and characterization of the polyclonal antibodies were also performed by techniques well known in the art. Immunohistochemical analysis showed that the P504S polypeptide was expressed in 100% of prostate carcinoma samples tested (n=5).

The rabbit-anti-P504S polyclonal antibody did not appear to label benign prostate cells with the same cytoplasmic granular staining, but rather with light nuclear staining. Analysis of normal tissues revealed that the encoded polypeptide was found to be expressed in some, but not all normal human tissues. Positive

cytoplasmic staining with rabbit-anti-P504S polyclonal antibody was found in normal human kidney, liver, brain, colon and lung-associated macrophages, whereas heart and bone marrow were negative.

This data indicates that the P504S polypeptide is present in prostate cancer tissues, and that there are qualitative and quantitative differences in the staining between benign prostatic hyperplasia tissues and prostate cancer tissues, suggesting that this polypeptide may be detected selectively in prostate tumors and therefore be useful in the diagnosis of prostate cancer.

EXAMPLE 3

ISOLATION AND CHARACTERIZATION OF PROSTATE TUMOR
POLYPEPTIDES BY PCR-BASED SUBTRACTION

A cDNA subtraction library, containing cDNA from normal prostate subtracted with ten other normal tissue cDNAs (brain, heart, kidney, liver, lung, ovary, placenta, skeletal muscle, spleen and thymus) and then submitted to a first round of PCR amplification, was purchased from Clontech. This library was subjected to a second round of PCR amplification, following the manufacturer's protocol. The resulting cDNA fragments were subcloned into the vector pT7 Blue T-vector (Novagen, Madison, WI) and transformed into XL-1 Blue MRF' *E. coli* (Stratagene). DNA was isolated from independent clones and sequenced using a Perkin Elmer/Applied Biosystems Division Automated Sequencer Model 373A.

Fifty-nine positive clones were sequenced. Comparison of the DNA sequences of these clones with those in the gene bank, as described above, revealed no significant homologies to 25 of these clones, hereinafter referred to as P5, P8, P9, P18, P20, P30, P34, P36, P38, P39, P42, P49, P50, P53, P55, P60, P64, P65, P73, P75, P76, P79 and P84. The determined cDNA sequences for these clones are provided in SEQ ID NO: 41-45, 47-52 and 54-65, respectively. P29, P47, P68, P80 and P82 (SEQ ID NO: 46, 53 and 66-68, respectively) were found to show some degree of homology to

previously identified DNA sequences. To the best of the inventors' knowledge, none of these sequences have been previously shown to be present in prostate.

Further studies using the PCR-based methodology described above resulted in the isolation of more than 180 additional clones, of which 23 clones were found to show no significant homologies to known sequences. The determined cDNA sequences for these clones are provided in SEQ ID NO: 115-123, 127, 131, 137, 145, 147-151, 153, 156-158 and 160. Twenty-three clones (SEQ ID NO: 124-126, 128-130, 132-136, 138-144, 146, 152, 154, 155 and 159) were found to show some homology to previously identified ESTs. An additional ten clones (SEQ ID NO: 161-170) were found to have some degree of homology to known genes. Larger cDNA clones containing the P20 sequence represent splice variants of a gene referred to as P703P. The determined DNA sequence for the variants referred to as DE1, DE13 and DE14 are provided in SEQ ID NOS: 171, 175 and 177, respectively, with the corresponding predicted amino acid sequences being provided in SEQ ID NO: 172, 176 and 178, respectively. The determined cDNA sequence for an extended spliced form of P703 is provided in SEQ ID NO: 225. The DNA sequences for the splice variants referred to as DE2 and DE6 are provided in SEQ ID NOS: 173 and 174, respectively.

mRNA Expression levels for representative clones in tumor tissues (prostate (n=5), breast (n=2), colon and lung) normal tissues (prostate (n=5), colon, kidney, liver, lung (n=2), ovary (n=2), skeletal muscle, skin, stomach, small intestine and brain), and activated and non-activated PBMC was determined by RT-PCR as described above. Expression was examined in one sample of each tissue type unless otherwise indicated.

P9 was found to be highly expressed in normal prostate and prostate tumor compared to all normal tissues tested except for normal colon which showed comparable expression. P20, a portion of the P703P gene, was found to be highly expressed in normal prostate and prostate tumor, compared to all twelve normal tissues tested. A modest increase in expression of P20 in breast tumor (n=2), colon tumor and lung tumor was seen compared to all normal tissues except lung (1 of 2). Increased expression of P18 was found in normal prostate, prostate tumor and breast tumor

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compared to other normal tissues except lung and stomach. A modest increase in expression of P5 was observed in normal prostate compared to most other normal tissues. However, some elevated expression was seen in normal lung and PBMC. Elevated expression of P5 was also observed in prostate tumors (2 of 5), breast tumor and one lung tumor sample. For P30, similar expression levels were seen in normal prostate and prostate tumor, compared to six of twelve other normal tissues tested. Increased expression was seen in breast tumors, one lung tumor sample and one colon tumor sample, and also in normal PBMC. P29 was found to be over-expressed in prostate tumor (5 of 5) and normal prostate (5 of 5) compared to the majority of normal tissues. However, substantial expression of P29 was observed in normal colon and normal lung (2 of 2). P80 was found to be over-expressed in prostate tumor (5 of 5) and normal prostate (5 of 5) compared to all other normal tissues tested, with increased expression also being seen in colon tumor.

Further studies resulted in the isolation of twelve additional clones, hereinafter referred to as 10-d8, 10-h10, 11-c8, 7-g6, 8-b5, 8-b6, 8-d4, 8-d9, 8-g3, 8-h11, 9-f12 and 9-f3. The determined DNA sequences for 10-d8, 10-h10, 11-c8, 8-d4, 8-d9, 8-h11, 9-f12 and 9-f3 are provided in SEQ ID NO: 207, 208, 209, 216, 217, 220, 221 and 222, respectively. The determined forward and reverse DNA sequences for 7-g6, 8-b5, 8-b6 and 8-g3 are provided in SEQ ID NO: 210 and 211; 212 and 213; 214 and 215; and 218 and 219, respectively. Comparison of these sequences with those in the gene bank revealed no significant homologies to the sequence of 9-f3. The clones 10-d8, 11-c8 and 8-h11 were found to show some homology to previously isolated ESTs, while 10-h10, 8-b5, 8-b6, 8-d4, 8-d9, 8-g3 and 9-f12 were found to show some homology to previously identified genes. Further characterization of 7-G6 and 8-G3 showed identity to the known genes PAP and PSA, respectively.

mRNA expression levels for these clones were determined using the micro-array technology described above. The clones 7-G6, 8-G3, 8-B5, 8-B6, 8-D4, 8-D9, 9-F3, 9-F12, 9-H3, 10-A2, 10-A4, 11-C9 and 11-F2 were found to be over-expressed in prostate tumor and normal prostate, with expression in other tissues tested being low or undetectable. Increased expression of 8-F11 was seen in prostate tumor

and normal prostate, bladder, skeletal muscle and colon. Increased expression of 10-H10 was seen in prostate tumor and normal prostate, bladder, lung, colon, brain and large intestine. Increased expression of 9-B1 was seen in prostate tumor, breast tumor, and normal prostate, salivary gland, large intestine and skin, with increased expression of 11-C8 being seen in prostate tumor, and normal prostate and large intestine.

An additional cDNA fragment derived from the PCR-based normal prostate subtraction, described above, was found to be prostate specific by both micro-array technology and RT-PCR. The determined cDNA sequence of this clone (referred to as 9-A11) is provided in SEQ ID NO: 226. Comparison of this sequence with those in the public databases revealed 99% identity to the known gene HOXB13.

Further studies led to the isolation of the clones 8-C6 and 8-H7. The determined cDNA sequences for these clones are provided in SEQ ID NO: 227 and 228, respectively. These sequences were found to show some homology to previously isolated ESTs.

PCR and hybridization-based methodologies were employed to obtain longer cDNA sequences for clone P20 (also referred to as P703P), yielding three additional cDNA fragments that progressively extend the 5' end of the gene. These fragments, referred to as P703PDE5, P703P6.26, and P703PX-23 (SEQ ID NO: 326, 328 and 330, with the predicted corresponding amino acid sequences being provided in SEQ ID NO: 327, 329 and 331, respectively) contain additional 5' sequence. P703PDE5 was recovered by screening of a cDNA library (#141-26) with a portion of P703P as a probe. P703P6.26 was recovered from a mixture of three prostate tumor cDNAs and P703PX_23 was recovered from cDNA library (#438-48). Together, the additional sequences include all of the putative mature serine protease along with part of the putative signal sequence. Further studies using a PCR-based subtraction library of a prostate tumor pool subtracted against a pool of normal tissues (referred to as JP: PCR subtraction) resulted in the isolation of thirteen additional clones, seven of which did not share any significant homology to known GenBank sequences. The determined cDNA sequences for these seven clones (P711P, P712P, novel 23, P774P, P775P, P710P and P768P) are provided in SEQ ID NO: 307-311, 313 and 315, respectively.

The remaining six clones (SEQ ID NO: 316 and 321-325) were shown to share some homology to known genes. By microarray analysis, all thirteen clones showed three or more fold over-expression in prostate tissues, including prostate tumors, BPH and normal prostate as compared to normal non-prostate tissues. Clones P711P, P712P, novel 23 and P768P showed over-expression in most prostate tumors and BPH tissues tested (n=29), and in the majority of normal prostate tissues (n=4), but background to low expression levels in all normal tissues. Clones P774P, P775P and P710P showed comparatively lower expression and expression in fewer prostate tumors and BPH samples, with negative to low expression in normal prostate.

The full-length cDNA for P711P was obtained by employing the partial sequence of SEQ ID NO: 307 to screen a prostate cDNA library. Specifically, a directionally cloned prostate cDNA library was prepared using standard techniques. One million colonies of this library were plated onto LB/Amp plates. Nylon membrane filters were used to lift these colonies, and the cDNAs which were picked up by these filters were denatured and cross-linked to the filters by UV light. The P711P cDNA fragment of SEQ ID NO: 307 was radio-labeled and used to hybridize with these filters. Positive clones were selected, and cDNAs were prepared and sequenced using an automatic Perkin Elmer/Applied Biosystems sequencer. The determined full-length sequence of P711P is provided in SEQ ID NO: 382, with the corresponding predicted amino acid sequence being provided in SEQ ID NO: 383.

Using PCR and hybridization-based methodologies, additional cDNA sequence information was derived for two clones described above, 11-C9 and 9-F3, herein after referred to as P707P and P714P, respectively (SEQ ID NO: 333 and 334). After comparison with the most recent GenBank, P707P was found to be a splice variant of the known gene HoxB13. In contrast, no significant homologies to P714P were found.

Clones 8-B3, P89, P98, P130 and P201 (as disclosed in U.S. Patent Application No. 09/020,956, filed February 9, 1998) were found to be contained within one contiguous sequence, referred to as P705P (SEQ ID NO: 335, with the predicted

amino acid sequence provided in SEQ ID NO: 336), which was determined to be a splice variant of the known gene NKX 3.1.

EXAMPLE 4

SYNTHESIS OF POLYPEPTIDES

Polypeptides may be synthesized on a Perkin Elmer/Applied Biosystems 430A peptide synthesizer using FMOC chemistry with HPTU (O-Benzotriazole-N,N,N',N'-tetramethyluronium hexafluorophosphate) activation. A Gly-Cys-Gly sequence may be attached to the amino terminus of the peptide to provide a method of conjugation, binding to an immobilized surface, or labeling of the peptide. Cleavage of the peptides from the solid support may be carried out using the following cleavage mixture: trifluoroacetic acid:ethanedithiol:thioanisole:water:phenol (40:1:2:2:3). After cleaving for 2 hours, the peptides may be precipitated in cold methyl-t-butyl-ether. The peptide pellets may then be dissolved in water containing 0.1% trifluoroacetic acid (TFA) and lyophilized prior to purification by C18 reverse phase HPLC. A gradient of 0%-60% acetonitrile (containing 0.1% TFA) in water (containing 0.1% TFA) may be used to elute the peptides. Following lyophilization of the pure fractions, the peptides may be characterized using electrospray or other types of mass spectrometry and by amino acid analysis.

EXAMPLE 5

FURTHER ISOLATION AND CHARACTERIZATION OF PROSTATE TUMOR POLYPEPTIDES BY PCR-BASED SUBTRACTION

A cDNA library generated from prostate primary tumor mRNA as described above was subtracted with cDNA from normal prostate. The subtraction was performed using a PCR-based protocol (Clontech), which was modified to generate larger fragments. Within this protocol, tester and driver double stranded cDNA were

separately digested with five restriction enzymes that recognize six-nucleotide restriction sites (MluI, MscI, PvuII, SalI and StuI). This digestion resulted in an average cDNA size of 600 bp, rather than the average size of 300 bp that results from digestion with RsaI according to the Clontech protocol. This modification did not affect the subtraction efficiency. Two tester populations were then created with different adapters, and the driver library remained without adapters.

The tester and driver libraries were then hybridized using excess driver cDNA. In the first hybridization step, driver was separately hybridized with each of the two tester cDNA populations. This resulted in populations of (a) unhybridized tester cDNAs, (b) tester cDNAs hybridized to other tester cDNAs, (c) tester cDNAs hybridized to driver cDNAs and (d) unhybridized driver cDNAs. The two separate hybridization reactions were then combined, and rehybridized in the presence of additional denatured driver cDNA. Following this second hybridization, in addition to populations (a) through (d), a fifth population (e) was generated in which tester cDNA with one adapter hybridized to tester cDNA with the second adapter. Accordingly, the second hybridization step resulted in enrichment of differentially expressed sequences which could be used as templates for PCR amplification with adaptor-specific primers.

The ends were then filled in, and PCR amplification was performed using adaptor-specific primers. Only population (e), which contained tester cDNA that did not hybridize to driver cDNA, was amplified exponentially. A second PCR amplification step was then performed, to reduce background and further enrich differentially expressed sequences.

This PCR-based subtraction technique normalizes differentially expressed cDNAs so that rare transcripts that are overexpressed in prostate tumor tissue may be recoverable. Such transcripts would be difficult to recover by traditional subtraction methods.

In addition to genes known to be overexpressed in prostate tumor, seventy-seven further clones were identified. Sequences of these partial cDNAs are provided in SEQ ID NO: 29 to 305. Most of these clones had no significant homology to database sequences. Exceptions were JPTPN23 (SEQ ID NO: 231; similarity to pig

valosin-containing protein), JPTPN30 (SEQ ID NO: 234; similarity to rat mRNA for proteasome subunit), JPTPN45 (SEQ ID NO: 243; similarity to rat *norvegicus* cytosolic NADP-dependent isocitrate dehydrogenase), JPTPN46 (SEQ ID NO: 244; similarity to human subclone H8 4 d4 DNA sequence), JP1D6 (SEQ ID NO: 265; similarity to *G. gallus* dynein light chain-A), JP8D6 (SEQ ID NO: 288; similarity to human BAC clone RG016J04), JP8F5 (SEQ ID NO: 289; similarity to human subclone H8 3 b5 DNA sequence), and JP8E9 (SEQ ID NO: 299; similarity to human Alu sequence).

Additional studies using the PCR-based subtraction library consisting of a prostate tumor pool subtracted against a normal prostate pool (referred to as PT-PN PCR subtraction) yielded three additional clones. Comparison of the cDNA sequences of these clones with the most recent release of GenBank revealed no significant homologies to the two clones referred to as P715P and P767P (SEQ ID NO: 312 and 314). The remaining clone was found to show some homology to the known gene KIAA0056 (SEQ ID NO: 318). Using microarray analysis to measure mRNA expression levels in various tissues, all three clones were found to be over-expressed in prostate tumors and BPH tissues. Specifically, clone P715P was over-expressed in most prostate tumors and BPH tissues by a factor of three or greater, with elevated expression seen in the majority of normal prostate samples and in fetal tissue, but negative to low expression in all other normal tissues. Clone P767P was over-expressed in several prostate tumors and BPH tissues, with moderate expression levels in half of the normal prostate samples, and background to low expression in all other normal tissues tested.

Further analysis, by microarray as described above, of the PT-PN PCR subtraction library and of a DNA subtraction library containing cDNA from prostate tumor subtracted with a pool of normal tissue cDNAs, led to the isolation of 27 additional clones (SEQ ID NO: 340-365 and 381) which were determined to be over-expressed in prostate tumor. The clones of SEQ ID NO: 341, 342, 345, 347, 348, 349, 351, 355-359, 361, 362 and 364 were also found to be expressed in normal prostate. Expression of all 26 clones in a variety of normal tissues was found to be low or undetectable, with the exception of P544S (SEQ ID NO: 356) which was found to be

expressed in small intestine. Of the 26 clones, 10 (SEQ ID NO: 340-349) were found to show some homology to previously identified sequences. No significant homologies were found to the clones of SEQ ID NO: 350-365.

EXAMPLE 6
PEPTIDE PRIMING OF MICE AND PROPAGATION OF CTL LINES

6.1. This Example illustrates the preparation of a CTL cell line specific for cells expressing the P502S gene.

Mice expressing the transgene for human HLA A2.1 (provided by Dr L. Sherman, The Scripps Research Institute, La Jolla, CA) were immunized with P2S#12 peptide (VLGWVAEL; SEQ ID NO: 306), which is derived from the P502S gene (also referred to herein as J1-17, SEQ ID NO: 8), as described by Theobald et al., *Proc. Natl. Acad. Sci. USA 92*:11993-11997, 1995 with the following modifications. Mice were immunized with 100μg of P2S#12 and 120μg of an I-A^b binding peptide derived from hepatitis B Virus protein emulsified in incomplete Freund's adjuvant. Three weeks later these mice were sacrificed and using a nylon mesh single cell suspensions prepared. Cells were then resuspended at 6 x 10^6 cells/ml in complete media (RPMI-1640; Gibco BRL, Gaithersburg, MD) containing 10% FCS, 2mM Glutamine (Gibco BRL), sodium pyruvate (Gibco BRL), non-essential amino acids (Gibco BRL), 2 x 10^{-5} M 2-mercaptoethanol, 50U/ml penicillin and streptomycin, and cultured in the presence of irradiated (3000 rads) P2S#12-pulsed (5mg/ml P2S#12 and 10mg/ml β2-microglobulin) LPS blasts (A2 transgenic spleens cells cultured in the presence of 7μg/ml dextran sulfate and 25μg/ml LPS for 3 days). Six days later, cells (5 x 10^5/ml) were restimulated with 2.5 x 10^6/ml peptide pulsed irradiated (20,000 rads) EL4A2Kb cells (Sherman et al, *Science 258*:815-818, 1992) and 3 x 10^6/ml A2 transgenic spleen feeder cells. Cells were cultured in the presence of 20U/ml IL-2. Cells continued to be restimulated on a weekly basis as described, in preparation for cloning the line.

P2S#12 line was cloned by limiting dilution analysis with peptide pulsed EL4 A2Kb tumor cells (1 x 10^4 cells/ well) as stimulators and A2 transgenic spleen cells

as feeders (5 x 10⁵ cells/ well) grown in the presence of 30U/ml IL-2. On day 14, cells were restimulated as before. On day 21, clones that were growing were isolated and maintained in culture. Several of these clones demonstrated significantly higher reactivity (lysis) against human fibroblasts (HLA A2.1 expressing) transduced with P502S than against control fibroblasts. An example is presented in Figure 1.

This data indicates that P2S #12 represents a naturally processed epitope of the P502S protein that is expressed in the context of the human HLA A2.1 molecule.

6.2. This Example illustrates the preparation of murine CTL lines and CTL clones specific for cells expressing the P501S gene.

This series of experiments were performed similarly to that described above. Mice were immunized with the P1S#10 peptide (SEQ ID NO: 337), which is derived from the P501S gene (also referred to herein as L1-12, SEQ ID NO: 110). The P1S#10 peptide was derived by analysis of the predicted polypeptide sequence for P501S for potential HLA-A2 binding sequences as defined by published HLA-A2 binding motifs (Parker, KC, et al, J. Immunol., 152:163, 1994). P1S#10 peptide was synthesized as described in Example 4, and empirically tested for HLA-A2 binding using a T cell based competition assay. Predicted A2 binding peptides were tested for their ability to compete HLA-A2 specific peptide presentation to an HLA-A2 restricted CTL clone (D150M58), which is specific for the HLA-A2 binding influenza matrix peptide fluM58. D150M58 CTL secretes TNF in response to self-presentation of peptide fluM58. In the competition assay, test peptides at 100-200 µg/ml were added to cultures of D150M58 CTL in order to bind HLA-A2 on the CTL. After thirty minutes, CTL cultured with test peptides, or control peptides, were tested for their antigen dose response to the fluM58 peptide in a standard TNF bioassay. As shown in Figure 3, peptide P1S#10 competes HLA-A2 restricted presentation of fluM58, demonstrating that peptide P1S#10 binds HLA-A2.

Mice expressing the transgene for human HLA A2.1 were immunized as described by Theobald et al. (*Proc. Natl. Acad. Sci. USA 92*:11993-11997, 1995) with the following modifications. Mice were immunized with 62.5µg of P1S #10 and 120µg

of an I-A^b binding peptide derived from Hepatitis B Virus protein emulsified in incomplete Freund's adjuvant. Three weeks later these mice were sacrificed and single cell suspensions prepared using a nylon mesh. Cells were then resuspended at 6 x 10^6 cells/ml in complete media (as described above) and cultured in the presence of irradiated (3000 rads) P1S#10-pulsed (2μg/ml P1S#10 and 10mg/ml β2-microglobulin) LPS blasts (A2 transgenic spleens cells cultured in the presence of 7μg/ml dextran sulfate and 25μg/ml LPS for 3 days). Six days later cells (5 x 10^5/ml) were restimulated with 2.5 x 10^6/ml peptide-pulsed irradiated (20,000 rads) EL4A2Kb cells, as described above, and 3 x 10^6/ml A2 transgenic spleen feeder cells. Cells were cultured in the presence of 20 U/ml IL-2. Cells were restimulated on a weekly basis in preparation for cloning. After three rounds of *in vitro* stimulations, one line was generated that recognized P1S#10-pulsed Jurkat A2Kb targets and P501S-transduced Jurkat targets as shown in Figure 4.

A P1S#10-specific CTL line was cloned by limiting dilution analysis with peptide pulsed EL4 A2Kb tumor cells (1 x 10^4 cells/ well) as stimulators and A2 transgenic spleen cells as feeders (5 x 10^5 cells/ well) grown in the presence of 30U/ml IL-2. On day 14, cells were restimulated as before. On day 21, viable clones were isolated and maintained in culture. As shown in Figure 5, five of these clones demonstrated specific cytolytic reactivity against P501S-transduced Jurkat A2Kb targets. This data indicates that P1S#10 represents a naturally processed epitope of the P501S protein that is expressed in the context of the human HLA-A2.1 molecule.

EXAMPLE 7

ABILITY OF HUMAN T CELLS TO RECOGNIZE PROSTATE TUMOR POLYPEPTIDES

This Example illustrates the ability of T cells specific for a prostate tumor polypeptide to recognize human tumor.

Human CD8⁺ T cells were primed *in vitro* to the P2S-12 peptide (SEQ ID NO: 306) derived from P502S (also referred to as J1-17) using dendritic cells according to the protocol of Van Tsai et al. (*Critical Reviews in Immunology 18*:65-75, 1998). The resulting CD8⁺ T cell microcultures were tested for their ability to recognize the P2S-12 peptide presented by autologous fibroblasts or fibroblasts which were transduced to express the P502S gene in a γ-interferon ELISPOT assay (*see* Lalvani et al., *J. Exp. Med. 186*:859-865, 1997). Briefly, titrating numbers of T cells were assayed in duplicate on 10⁴ fibroblasts in the presence of 3 μg/ml human β₂-microglobulin and 1 μg/ml P2S-12 peptide or control E75 peptide. In addition, T cells were simultaneously assayed on autologous fibroblasts transduced with the P502S gene or as a control, fibroblasts transduced with HER-2/*neu*. Prior to the assay, the fibroblasts were treated with 10 ng/ml γ-interferon for 48 hours to upregulate class I MHC expression. One of the microcultures (#5) demonstrated strong recognition of both peptide pulsed fibroblasts as well as transduced fibroblasts in a γ-interferon ELISPOT assay. Figure 2A demonstrates that there was a strong increase in the number of γ-interferon spots with increasing numbers of T cells on fibroblasts pulsed with the P2S-12 peptide (solid bars) but not with the control E75 peptide (open bars). This shows the ability of these T cells to specifically recognize the P2S-12 peptide. As shown in Figure 2B, this microculture also demonstrated an increase in the number of γ-interferon spots with increasing numbers of T cells on fibroblasts transduced to express the P502S gene but not the HER-2/*neu* gene. These results provide additional confirmatory evidence that the P2S-12 peptide is a naturally processed epitope of the P502S protein. Furthermore, this also demonstrates that there exists in the human T cell repertoire, high affinity T cells which are capable of recognizing this epitope. These T cells should also be capable of recognizing human tumors which express the P502S gene.

EXAMPLE 8

PRIMING OF CTL *IN VIVO* USING NAKED DNA IMMUNIZATION WITH A
PROSTATE ANTIGEN

The prostate tumor antigen L1-12, as described above, is also referred to
as P501S. HLA A2Kb Tg mice (provided by Dr L. Sherman, The Scripps Research
Institute, La Jolla, CA) were immunized with 100 µg VR10132-P501S either
intramuscularly or intradermally. The mice were immunized three times, with a two
week interval between immunizations. Two weeks after the last immunization, immune
spleen cells were cultured with Jurkat A2Kb-P501S transduced stimulator cells. CTL
lines were stimulated weekly. After two weeks of *in vitro* stimulation, CTL activity
was assessed against P501S transduced targets. Two out of 8 mice developed strong
anti-P501S CTL responses. These results demonstrate that P501S contains at least one
naturally processed A2-restricted CTL epitope.

EXAMPLE 9

GENERATION OF HUMAN CTL *IN VITRO* USING WHOLE GENE PRIMING
AND STIMULATION TECHNIQUES WITH PROSTATE TUMOR ANTIGEN

Using *in vitro* whole-gene priming with P501S-retrovirally transduced
autologous fibroblasts (see, for example, Yee et al, *The Journal of Immunology*,
157(9):4079-86, 1996), human CTL lines were derived that specifically recognize
autologous fibroblasts transduced with P501S (also known as L1-12), as determined by
interferon-γ ELISPOT analysis as described above. Using a panel of HLA-mismatched
fibroblast lines transduced with P501S, these CTL lines were shown to be restricted
HLA-A2 class I allele. Specifically, dendritic cells (DC) were differentiated from
monocyte cultures derived from PBMC of normal human donors by growing for five
days in RPMI medium containing 10% human serum, 50 ng/ml human GM-CSF and 30
ng/ml human IL-4. Following culture, DC were infected overnight with recombinant
P501S vaccinia virus at a multiplicity of infection (M.O.I) of five, and matured

overnight by the addition of 3 μg/ml CD40 ligand. Virus was inactivated by UV irradiation. CD8+ T cells were isolated using a magnetic bead system, and priming cultures were initiated using standard culture techniques. Cultures were restimulated every 7-10 days using autologous primary fibroblasts retrovirally transduced with P501S. Following four stimulation cycles, CD8+ T cell lines were identified that specifically produced interferon-γ when stimulated with P501S-transduced autologous fibroblasts. The P501S-specific activity could be sustained by the continued stimulation of the cultures with P501S-transduced fibroblasts in the presence of IL-15. A panel of HLA-mismatched fibroblast lines transduced with P501S were generated to define the restriction allele of the response. By measuring interferon-γ in an ELISPOT assay, the P501S specific response was shown to be restricted by HLA-A2. These results demonstrate that a CD8+ CTL response to P501S can be elicited.

EXAMPLE 10

IDENTIFICATION OF A NATURALLY PROCESSED CTL EPITOPE CONTAINED WITHIN A PROSTATE TUMOR ANTIGEN

The 9-mer peptide p5 (SEQ ID NO: 338) was derived from the P703P antigen (also referred to as P20). The p5 peptide is immunogenic in human HLA-A2 donors and is a naturally processed epitope. Antigen specific CD8+ T cells can be primed following repeated *in vitro* stimulations with monocytes pulsed with p5 peptide. These CTL specifically recognize p5-pulsed target cells in both ELISPOT (as described above) and chromium release assays. Additionally, immunization of HLA-A2 transgenic mice with p5 leads to the generation of CTL lines which recognize a variety of P703P transduced target cells expressing either HLA-A2Kb or HLA-A2. Specifically, HLA-A2 transgenic mice were immunized subcutaneously in the footpad with 100 μg of p5 peptide together with 140 μg of hepatitis B virus core peptide (a Th peptide) in Freund's incomplete adjuvant. Three weeks post immunization, spleen cells from immunized mice were stimulated *in vitro* with peptide-pulsed LPS blasts. CTL activity was assessed by chromium release assay five days after primary *in vitro*

stimulation. Retrovirally transduced cells expressing the control antigen P703P and HLA-A2Kb were used as targets. CTL lines that specifically recognized both p5-pulsed targets as well as P703P-expressing targets were identified.

Human *in vitro* priming experiments demonstrated that the p5 peptide is immunogenic in humans. Dendritic cells (DC) were differentiated from monocyte cultures derived from PBMC of normal human donors by culturing for five days in RPMI medium containing 10% human serum, 50 ng/ml human GM-CSF and 30 ng/ml human IL-4. Following culture, the DC were pulsed with p5 peptide and cultured with GM-CSF and IL-4 together with CD8+ T cell enriched PBMC. CTL lines were restimulated on a weekly basis with p5-pulsed monocytes. Five to six weeks after initiation of the CTL cultures, CTL recognition of p5-pulsed target cells was demonstrated.

EXAMPLE 11

EXPRESSION OF A BREAST TUMOR-DERIVED ANTIGEN

IN PROSTATE

Isolation of the antigen B305D from breast tumor by differential display is described in US Patent Application No. 08/700,014, filed August 20, 1996. Several different splice forms of this antigen were isolated. The determined cDNA sequences for these splice forms are provided in SEQ ID NO: 366-375, with the predicted amino acid sequences corresponding to the sequences of SEQ ID NO: 292, 298 and 301-303 being provided in SEQ ID NO: 299-306, respectively.

The expression levels of B305D in a variety of tumor and normal tissues were examined by real time PCR and by Northern analysis. The results indicated that B305D is highly expressed in breast tumor, prostate tumor, normal prostate tumor and normal testes, with expression being low or undetectable in all other tissues examined (colon tumor, lung tumor, ovary tumor, and normal bone marrow, colon, kidney, liver, lung, ovary, skin, small intestine, stomach).

EXAMPLE 12

ELICITATION OF PROSTATE TUMOR ANTIGEN-SPECIFIC CTL RESPONSES

IN HUMAN BLOOD

This Example illustrates the ability of a prostate tumor antigen to elicit a
CTL response in blood of normal humans.

Autologous dendritic cells (DC) were differentiated from monocyte
cultures derived from PBMC of normal donors by growth for five days in RPMI
medium containing 10% human serum, 50 ng/ml GMCSF and 30 ng/ml IL-4.
Following culture, DC were infected overnight with recombinant P501S-expressing
vaccinia virus at an M.O.I. of 5 and matured for 8 hours by the addition of 2
micrograms/ml CD40 ligand. Virus was inactivated by UV irradiation, CD8$^+$ cells were
isolated by positive selection using magnetic beads, and priming cultures were initiated
in 24-well plates. Following five stimulation cycles, CD8+ lines were identified that
specifically produced interferon-gamma when stimulated with autologous P501S-
transduced fibroblasts. The P501S-specific activity of cell line 3A-1 could be
maintained following additional stimulation cycles on autologous B-LCL transduced
with P501S. Line 3A-1 was shown to specifically recognize autologous B-LCL
transduced to express P501S, but not EGFP-transduced autologous B-LCL, as measured
by cytotoxity assays (^{51}Cr release) and interferon-gamma production (Interferon-gamma
Elispot; *see* above and Lalvani et al., *J. Exp. Med.* *186*:859-865, 1997). The results of
these assays are presented in Figures 6A and 6B.

EXAMPLE 13

IDENTIFICATION OF PROSTATE TUMOR ANTIGENS

BY MICROARRAY ANALYSIS

This Example describes the isolation of certain prostate tumor
polypeptides from a prostate tumor cDNA library.

A human prostate tumor cDNA expression library as described above was screened using microarray analysis to identify clones that display at least a three fold over-expression in prostate tumor and/or normal prostate tissue, as compared to non-prostate normal tissues (not including testis). 372 clones were identified, and 319 were successfully sequenced. Table I presents a summary of these clones, which are shown in SEQ ID NOs:385-400. Of these sequences SEQ ID NOs:386, 389, 390 and 392 correspond to novel genes, and SEQ ID NOs: 393 and 396 correspond to previously identified sequences. The others (SEQ ID NOs:385, 387, 388, 391, 394, 395 and 397-400) correspond to known sequences, as shown in Table I.

Table I

Summary of Prostate Tumor Antigens

Known Genes	Previously identified Genes	Novel Genes
T-cell gamma chain	P504S	23379 (SEQ ID NO:389)
Kallikrein	P1000C	23399 (SEQ ID NO:392)
Vector	P501S	23320 (SEQ ID NO:386)
CGI-82 protein mRNA (23319; SEQ ID NO:385)	P503S	23381 (SEQ ID NO:390)
PSA	P510S	
Ald. 6 Dehyd.	P784P	
L-iditol-2 dehydrogenase (23376; SEQ ID NO:388)	P502S	
Ets transcription factor PDEF (22672; SEQ ID NO:398)	P706P	
hTGR (22678; SEQ ID NO:399)	19142.2, bangur.seq (22621; SEQ ID NO:396)	
KIAA0295(22685; SEQ ID NO:400)	5566.1 Wang(23404; SEQ ID NO:393)	
Prostatic Acid Phosphatase(22655; SEQ ID NO:397)	P712P	
transglutaminase (22611; SEQ ID NO:395)	P778P	
HDLBP (23508; SEQ ID NO:394)		
CGI-69 Protein(23367; SEQ ID NO:387)		
KIAA0122(23383; SEQ ID NO:391)		
TEEG		

CGI-82 showed 4.06 fold over-expression in prostate tissues as

compared to other normal tissues tested. It was over-expressed in 43% of prostate tumors, 25% normal prostate, not detected in other normal tissues tested. L-iditol-2 dehydrogenase showed 4.94 fold over-expression in prostate tissues as compared to other normal tissues tested. It was over-expressed in 90% of prostate tumors, 100% of normal prostate, and not detected in other normal tissues tested. Ets transcription factor PDEF showed 5.55 fold over-expression in prostate tissues as compared to other normal tissues tested. It was over-expressed in 47% prostate tumors, 25% normal prostate and not detected in other normal tissues tested. hTGR1 showed 9.11 fold over-expression in prostate tissues as compared to other normal tissues tested. It was over-expressed in 63% of prostate tumors and is not detected in normal tissues tested including normal prostate. KIAA0295 showed 5.59 fold over-expression in prostate tissues as compared to other normal tissues tested. It was over-expressed in 47% of prostate tumors, low to undetectable in normal tissues tested including normal prostate tissues. Prostatic acid phosphatase showed 9.14 fold over-expression in prostate tissues as compared to other normal tissues tested. It was over-expressed in 67% of prostate tumors, 50% of normal prostate, and not detected in other normal tissues tested. Transglutaminase showed 14.84 fold over-expression in prostate tissues as compared to other normal tissues tested. It was over-expressed in 30% of prostate tumors, 50% of normal prostate, and is not detected in other normal tissues tested. High density lipoprotein binding protein (HDLBP) showed 28.06 fold over-expression in prostate tissues as compared to other normal tissues tested. It was over-expressed in 97% of prostate tumors, 75% of normal prostate, and is undetectable in all other normal tissues tested. CGI-69 showed 3.56 fold over-expression in prostate tissues as compared to other normal tissues tested. It is a low abundant gene, detected in more than 90% of prostate tumors, and in 75% normal prostate tissues. The expression of this gene in normal tissues was very low. KIAA0122 showed 4.24 fold over-expression in prostate tissues as compared to other normal tissues tested. It was over-expressed in 57% of prostate tumors, it was undetectable in all normal tissues tested including normal prostate tissues. 19142.2 bangur showed 23.25 fold over-expression in prostate tissues as compared to other normal tissues tested. It was over-expressed in 97% of prostate tumors and 100% of

normal prostate. It was undetectable in other normal tissues tested. 5566.1 Wang
showed 3.31 fold over-expression in prostate tissues as compared to other normal
tissues tested. It was over-expressed in 97% of prostate tumors, 75% normal prostate
and was also over-expressed in normal bone marrow, pancreas, and activated PBMC.
Novel clone 23379 showed 4.86 fold over-expression in prostate tissues as compared to
other normal tissues tested. It was detectable in 97% of prostate tumors and 75%
normal prostate and is undetectable in all other normal tissues tested. Novel clone
23399 showed 4.09 fold over-expression in prostate tissues as compared to other normal
tissues tested. It was over-expressed in 27% of prostate tumors and was undetectable in
all normal tissues tested including normal prostate tissues. Novel clone 23320 showed
3.15 fold over-expression in prostate tissues as compared to other normal tissues tested.
It was detectable in all prostate tumors and 50% of normal prostate tissues. It was also
expressed in normal colon and trachea. Other normal tissues do not express this gene at
high level.

EXAMPLE 14

IDENTIFICATION OF PROSTATE TUMOR ANTIGENS
BY ELECTRONIC SUBTRACTION

        This Example describes the use of an electronic subtraction technique to
identify prostate tumor antigens.
        Potential prostate-specific genes present in the GenBank human EST
database were identified by electronic subtraction (similar to that described by
Vasmatizis et al., *Proc. Natl. Acad. Sci. USA 95*:300-304, 1998). The sequences of EST
clones (43,482) derived from various prostate libraries were obtained from the GenBank
public human EST database. Each prostate EST sequence was used as a query sequence
in a BLASTN (National Center for Biotechnology Information) search against the
human EST database. All matches considered identical (length of matching sequence
>100 base pairs, density of identical matches over this region > 70%) were grouped

(aligned) together in a cluster. Clusters containing more than 200 ESTs were discarded since they probably represented repetitive elements or highly expressed genes such as those for ribosomal proteins. If two or more clusters shared common ESTs, those clusters were grouped together into a "supercluster," resulting in 4,345 prostate superclusters.

Records for the 479 human cDNA libraries represented in the GenBank release were downloaded to create a database of these cDNA library records. These 479 cDNA libraries were grouped into three groups, Plus (normal prostate and prostate tumor libraries, and breast cell lines, in which expression was desired), Minus (libraries from other normal adult tissues, in which expression was not desirable), and Other (fetal tissue, infant tissue, tissues found only in women, non-prostate tumors and cell lines other than prostate cell lines, in which expression was considered to be irrelevant). A summary of these library groups is presented in Table II.

Table II

Prostate cDNA Libraries and ESTs

Library	# of Libraries	# of ESTs
Plus	25	43,482
Normal	11	18,875
Tumor	11	21,769
Cell lines	3	2,838
Minus	166	
Other	287	

Each supercluster was analyzed in terms of the ESTs within the supercluster. The tissue source of each EST clone was noted and used to classify the superclusters into four groups: Type 1- EST clones found in the Plus group libraries only; no expression detected in Minus or Other group libraries; Type 2- EST clones found in the Plus and Other group libraries only; no expression detected in the Minus group; Type 3- EST clones found in the Plus, Minus and Other group libraries, but the

expression in the Plus group is higher than in either the Minus or Other groups; and
Type 4- EST clones found in Plus, Minus and Other group libraries, but the expression
in the Plus group is higher than the expression in the Minus group. This analysis
identified 4,345 breast clusters (*see* Table III). From these clusters, 3,172 EST clones
were ordered from Research Genetics, Inc., and were received as frozen glycerol stocks
in 96-well plates.

Table III

Prostate Cluster Summary

Type	# of Superclusters	# of ESTs Ordered
1	688	677
2	2899	2484
3	85	11
4	673	0
Total	4345	3172

The inserts were PCR-amplified using amino-linked PCR primers for
Synteni microarray analysis. When more than one PCR product was obtained for a
particular clone, that PCR product was not used for expression analysis. In total, 2,528
clones from the electronic subtraction method were analyzed by microarray analysis to
identify electronic subtraction breast clones that had high tumor vs. normal tissue
mRNA. Such screens were performed using a Synteni (Palo Alto, CA) microarray,
according to the manufacturer's instructions (and essentially as described by Schena et
al., *Proc. Natl. Acad. Sci. USA 93*:10614-10619, 1996 and Heller et al., *Proc. Natl.
Acad. Sci. USA 94*:2150-2155, 1997). Within these analyses, the clones were arrayed
on the chip, which was then probed with fluorescent probes generated from normal and
tumor prostate cDNA, as well as various other normal tissues. The slides were scanned
and the fluorescence intensity was measured.

Clones with an expression ratio greater than 3 (*i.e.*, the level in prostate
tumor cDNA was at least three times the level in normal prostate cDNA) were

identified as prostate tumor-specific sequences (Table IV). The sequences of these clones are provided in SEQ ID NOs:401-453, with certain novel sequences shown in SEQ ID NOs:407, 413, 416-419, 422, 426, 427 and 450.

<u>Table IV</u>

<u>Prostate-tumor Specific Clones</u>

SEQ ID NO.	Sequence Designation	Comments
401	22545	previously identified P1000C
402	22547	previously identified P704P
403	22548	known
404	22550	known
405	22551	PSA
406	22552	prostate secretory protein 94
407	22553	novel
408	22558	previously identified P509S
409	22562	glandular kallikrein
410	22565	previously identified P1000C
411	22567	PAP
412	22568	B1006C (breast tumor antigen)
413	22570	novel
414	22571	PSA
415	22572	previously identified P706P
416	22573	novel
417	22574	novel
418	22575	novel
419	22580	novel
420	22581	PAP
421	22582	prostatic secretory protein 94
422	22583	novel
423	22584	prostatic secretory protein 94
424	22585	prostatic secretory protein 94
425	22586	known
426	22587	novel
427	22588	novel
428	22589	PAP
429	22590	known
430	22591	PSA
431	22592	known
432	22593	Previously identified P777P

433	22594	T cell receptor gamma chain
434	22595	Previously identified P705P
435	22596	Previously identified P707P
436	22847	PAP
437	22848	known
438	22849	prostatic secretory protein 57
439	22851	PAP
440	22852	PAP
441	22853	PAP
442	22854	previously identified P509S
443	22855	previously identified P705P
444	22856	previously identified P774P
445	22857	PSA
446	23601	previously identified P777P
447	23602	PSA
448	23605	PSA
449	23606	PSA
450	23612	novel
451	23614	PSA
452	23618	previously identified P1000C
453	23622	previously identified P705P

EXAMPLE 15

FURTHER IDENTIFICATION OF PROSTATE TUMOR ANTIGENS
BY MICROARRAY ANALYSIS

This Example describes the isolation of additional prostate tumor
polypeptides from a prostate tumor cDNA library.

A human prostate tumor cDNA expression library as described above
was screened using microarray analysis to identify clones that display at least a three
fold over-expression in prostate tumor and/or normal prostate tissue, as compared to
non-prostate normal tissues (not including testis). 142 clones were identified and
sequenced. Certain of these clones are shown in SEQ ID NOs:454-467. Of these
sequences SEQ ID NOs:459-461 correspond to novel genes. The others (SEQ ID
NOs:454-458 and 461-467) correspond to known sequences.

EXAMPLE 16

FURTHER CHARACTERIZATION OF PROSTATE TUMOR ANTIGEN P710P

This Example describes the full length cloning of P710P.

The prostate cDNA library described above was screened with the P710P fragment described above. One million colonies were plated on LB/Ampicillin plates. Nylon membrane filters were used to lift these colonies, and the cDNAs picked up by these filters were then denatured and cross-linked to the filters by UV light. The P710P fragment was radiolabeled and used to hybridize with the filters. Positive cDNA clones were selected and their cDNAs recovered and sequenced by an automatic ABI Sequencer. Four sequences were obtained, and are presented in SEQ ID NOs:468-471.

From the foregoing, it will be appreciated that, although specific embodiments of the invention have been described herein for the purposes of illustration, various modifications may be made without deviating from the spirit and scope of the invention. Accordingly, the present invention is not limited except as by the appended claims.

CLAIMS

1.   An isolated polypeptide comprising at least an immunogenic portion of a prostate tumor protein, or a variant thereof, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of:

(a)   sequences recited in any one of SEQ ID NOs:2, 3, 8-29, 41-45, 47-52, 54-65, 70, 73-74, 79, 81, 87, 90, 92, 93, 97, 103, 104, 107, 109-111, 115-160, 171, 173-175, 177, 181, 188, 191, 193, 194, 198, 203, 204, 207, 209, 220, 222-225, 227-305, 307-315, 326, 328, 330, 332, 334, 350-365, 381, 382, 384, 386, 389, 390, 392, 393, 396, 401, 402, 407, 408, 410, 413, 415-419, 422, 426, 427, 432, 434, 435, 442-444, 446, 450, 452, 453, 459-461, 468-471 or 472;

(b)   sequences that hybridize to any of the foregoing sequences under moderately stringent conditions; and

(c)   complements of any of the sequence of (a) or (b).

2.   An isolated polypeptide according to claim 1, wherein the polypeptide comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs:2, 3, 8-29, 41-45, 47-52, 54-65, 70, 73-74, 79, 81, 87, 90, 92, 93, 97, 103, 104, 107, 109-111, 115-160, 171, 173-175, 177, 181, 188, 191, 193, 194, 198, 203, 204, 207, 209, 220, 222-225, 227-305, 307-315, 326, 328, 330, 332, 334, 350-365, 381, 382, 384, 386, 389, 390, 392, 393, 396, 401, 402, 407, 408, 410, 413, 415-419, 422, 426, 427, 432, 434, 435, 442-444, 446, 450, 452, 453, 459-461, 468-471 or 472, or a complement of any of the foregoing polynucleotide sequences.

3. .   An isolated polypeptide comprising a sequence recited in any one of SEQ ID NO: 108, 112, 113, 114, 172, 176, 178, 327, 329, 331, 339 and 383.

4.   An isolated polynucleotide encoding at least 15 amino acid residues of a prostate tumor protein, or a variant thereof that differs in one or more

substitutions, deletions, additions and/or insertions such that the ability of the variant to react with antigen-specific antisera is not substantially diminished, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide comprising a sequence recited in any one of SEQ ID NOs:2, 3, 8-29, 41-45, 47-52, 54-65, 70, 73-74, 79, 81, 87, 90, 92, 93, 97, 103, 104, 107, 109-111, 115-160, 171, 173-175, 177, 181, 188, 191, 193, 194, 198, 203, 204, 207, 209, 220, 222-225, 227-305, 307-315, 326, 328, 330, 332, 334, 350-365, 381, 382, 384, 386, 389, 390, 392, 393, 396, 401, 402, 407, 408, 410, 413, 415-419, 422, 426, 427, 432, 434, 435, 442-444, 446, 450, 452, 453, 459-461, 468-471 or 472, or a complement of any of the foregoing sequences.

5.   An isolated polynucleotide encoding a prostate tumor protein, or a variant thereof, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide comprising a sequence recited in any one of SEQ ID NOs:2, 3, 8-29, 41-45, 47-52, 54-65, 70, 73-74, 79, 81, 87, 90, 92, 93, 97, 103, 104, 107, 109-111, 115-160, 171, 173-175, 177, 181, 188, 191, 193, 194, 198, 203, 204, 207, 209, 220, 222-225, 227-305, 307-315, 326, 328, 330, 332, 334, 350-365, 381, 382, 384, 386, 389, 390, 392, 393, 396, 401, 402, 407, 408, 410, 413, 415-419, 422, 426, 427, 432, 434, 435, 442-444, 446, 450, 452, 453, 459-461, 468-471 or 472, or a complement of any of the foregoing sequences.

6.   An isolated polynucleotide comprising a sequence recited in any one of SEQ ID NOs:2, 3, 8-29, 41-45, 47-52, 54-65, 70, 73-74, 79, 81, 87, 90, 92, 93, 97, 103, 104, 107, 109-111, 115-160, 171, 173-175, 177, 181, 188, 191, 193, 194, 198, 203, 204, 207, 209, 220, 222-225, 227-305, 307-315, 326, 328, 330, 332, 334, 350-365, 381, 382, 384, 386, 389, 390, 392, 393, 396, 401, 402, 407, 408, 410, 413, 415-419, 422, 426, 427, 432, 434, 435, 442-444, 446, 450, 452, 453, 459-461, 468-471 or 472.

7.   An isolated polynucleotide comprising a sequence that hybridizes, under moderately stringent conditions, to a sequence recited in any one of

SEQ ID NOs:2, 3, 8-29, 41-45, 47-52, 54-65, 70, 73-74, 79, 81, 87, 90, 92, 93, 97, 103, 104, 107, 109-111, 115-160, 171, 173-175, 177, 181, 188, 191, 193, 194, 198, 203, 204, 207, 209, 220, 222-225, 227-305, 307-315, 326, 328, 330, 332, 334, 350-365, 381, 382, 384, 386, 389, 390, 392, 393, 396, 401, 402, 407, 408, 410, 413, 415-419, 422, 426, 427, 432, 434, 435, 442-444, 446, 450, 452, 453, 459-461, 468-471 or 472.

8.   An isolated polynucleotide complementary to a polynucleotide according to any one of claims 4-7.

9.   An expression vector comprising a polynucleotide according to any one of claims 4-7.

10.   A host cell transformed or transfected with an expression vector according to claim 9.

11.   An expression vector comprising a polynucleotide according claim 8.

12.   A host cell transformed or transfected with an expression vector according to claim 11.

13.   A pharmaceutical composition comprising a polypeptide according to claim 1, in combination with a physiologically acceptable carrier.

14.   A vaccine comprising a polypeptide according to claim 1, in combination with a non-specific immune response enhancer.

15.   A vaccine according to claim 14, wherein the non-specific immune response enhancer is an adjuvant.

16.   A vaccine according to claim 14, wherein the non-specific immune response enhancer induces a predominantly Type I response.

17.   A pharmaceutical composition comprising a polynucleotide according to claim 4, in combination with a physiologically acceptable carrier.

18.   A vaccine comprising a polynucleotide according to claim 4, in combination with a non-specific immune response enhancer.

19.   A vaccine according to claim 18, wherein the non-specific immune response enhancer is an adjuvant.

20.   A vaccine according to claim 18, wherein the non-specific immune response enhancer induces a predominantly Type I response.

21.   An isolated antibody, or antigen-binding fragment thereof, that specifically binds to a prostate tumor protein that comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs:2, 3, 8-29, 41-45, 47-52, 54-65, 70, 73-74, 79, 81, 87, 90, 92, 93, 97, 103, 104, 107, 109-111, 115-160, 171, 173-175, 177, 181, 188, 191, 193, 194, 198, 203, 204, 207, 209, 220, 222-225, 227-305, 307-315, 326, 328, 330, 332, 334, 350-365, 381, 382, 384, 386, 389, 390, 392, 393, 396, 401, 402, 407, 408, 410, 413, 415-419, 422, 426, 427, 432, 434, 435, 442-444, 446, 450, 452, 453, 459-461, 468-471 or 472 or a complement of any of the foregoing polynucleotide sequences.

22.   A pharmaceutical composition comprising an antibody or fragment thereof according to claim 18, in combination with a physiologically acceptable carrier.

23.   A pharmaceutical composition comprising an antigen-presenting cell that expresses a polypeptide according to claim 1, in combination with a pharmaceutically acceptable carrier or excipient.

24.   A pharmaceutical composition according to claim 23, wherein the antigen presenting cell is a dendritic cell or a macrophage.

25.   A vaccine comprising an antigen-presenting cell that expresses a polypeptide according to claim 1, in combination with a non-specific immune response enhancer.

26.   A vaccine according to claim 25, wherein the non-specific immune response enhancer is an adjuvant.

27.   A vaccine according to claim 25, wherein the non-specific immune response enhancer induces a predominantly Type I response.

28.   A vaccine according to claim 25, wherein the antigen-presenting cell is a dendritic cell.

29.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of a polypeptide according to claim 1, and thereby inhibiting the development of a cancer in the patient.

30.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of a polynucleotide according to claim 4, and thereby inhibiting the development of a cancer in the patient.

31.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of an antibody or antigen-

binding fragment thereof according to claim 21, and thereby inhibiting the development of a cancer in the patient.

32.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of an antigen-presenting cell that expresses a polypeptide according to claim 1, and thereby inhibiting the development of a cancer in the patient.

33.   A method according to claim 32, wherein the antigen-presenting cell is a dendritic cell.

34.   A method according to any one of claims 29-32, wherein the cancer is prostate cancer.

35.   A fusion protein comprising at least one polypeptide according to claim 1.

36.   A fusion protein according to claim 35, wherein the fusion protein comprises an expression enhancer that increases expression of the fusion protein in a host cell transfected with a polynucleotide encoding the fusion protein.

37.   A fusion protein according to claim 35, wherein the fusion protein comprises a T helper epitope that is not present within the polypeptide of claim 1.

38.   A fusion protein according to claim 35, wherein the fusion protein comprises an affinity tag.

39.   An isolated polynucleotide encoding a fusion protein according to claim 35.

40.   A pharmaceutical composition comprising a fusion protein according to claim 32, in combination with a physiologically acceptable carrier.

41.   A vaccine comprising a fusion protein according to claim 35, in combination with a non-specific immune response enhancer.

42.   A vaccine according to claim 41, wherein the non-specific immune response enhancer is an adjuvant.

43.   A vaccine according to claim 41, wherein the non-specific immune response enhancer induces a predominantly Type I response.

44.   A pharmaceutical composition comprising a polynucleotide according to claim 40, in combination with a physiologically acceptable carrier.

45.   A vaccine comprising a polynucleotide according to claim 40, in combination with a non-specific immune response enhancer.

46.   A vaccine according to claim 45, wherein the non-specific immune response enhancer is an adjuvant.

47.   A vaccine according to claim 45, wherein the non-specific immune response enhancer induces a predominantly Type I response.

48.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of a pharmaceutical composition according to claim 40 or claim 44.

49.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of a vaccine according to claim 41 or claim 45.

50.   A method for removing tumor cells from a biological sample, comprising contacting a biological sample with T cells that specifically react with a prostate tumor protein, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of:

(i)   polynucleotides recited in any one of SEQ ID NOs:1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472; and

(ii)   complements of the foregoing polynucleotides;

wherein the step of contacting is performed under conditions and for a time sufficient to permit the removal of cells expressing the prostate tumor protein from the sample.

51.   A method according to claim 50, wherein the biological sample is blood or a fraction thereof.

52.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient a biological sample treated according to the method of claim 50.

53.   A method for stimulating and/or expanding T cells specific for a prostate tumor protein, comprising contacting T cells with one or more of:

(i)   a polypeptide according to claim 1;

(ii)   a polypeptide encoded by a polynucleotide comprising a sequence provided in any one of SEQ ID NOs:1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472;

(iii)   a polynucleotide encoding a polypeptide of (i) or (ii); and/or

(iv)   an antigen presenting cell that expresses a polypeptide of (i) or (ii);

under conditions and for a time sufficient to permit the stimulation and/or expansion of T cells.

54.   An isolated T cell population, comprising T cells prepared according to the method of claim 53.

55.   A method for inhibiting the development of a cancer in a patient, comprising administering to a patient an effective amount of a T cell population according to claim 54.

56.   A method for inhibiting the development of a cancer in a patient, comprising the steps of:

(a)   incubating CD4$^+$ and/or CD8+ T cells isolated from a patient with at least one component selected from the group consisting of:

(i)   a polypeptide according to claim 1;

(ii)   a polypeptide encoded by a polynucleotide comprising a sequence of any one of SEQ ID NOs:1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472;

(iii)   a polynucleotide encoding a polypeptide of (i) or (ii); or

(iv)   an antigen-presenting cell that expresses a polypeptide of (i) or (ii);

such that T cells proliferate; and

(b)   administering to the patient an effective amount of the proliferated T cells, and thereby inhibiting the development of a cancer in the patient.

57.   A method for inhibiting the development of a cancer in a patient, comprising the steps of:

(a)   incubating CD4$^+$ and/or CD8+ T cells isolated from a patient with at least one component selected from the group consisting of:

(i)   a polypeptide according to claim 1;

(ii)   a polypeptide encoded by a polynucleotide comprising a sequence of any one of SEQ ID NOs: 1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472;

(iii)   a polynucleotide encoding a polypeptide of (i) or (ii); or

(iv)   an antigen-presenting cell that expresses a polypeptide of (i) or (ii);

such that T cells proliferate;

(b)   cloning at least one proliferated cell; and

(c)   administering to the patient an effective amount of the cloned T cells, and thereby inhibiting the development of a cancer in the patient.

58.   A method for determining the presence or absence of a cancer in a patient, comprising the steps of:

(a)   contacting a biological sample obtained from a patient with a binding agent that binds to a prostate tumor protein, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide sequence selected from the group consisting of:

(i)   polynucleotides recited in any one of SEQ ID NOs:1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472; and

(ii)   complements of the foregoing polynucleotides;

(b)   detecting in the sample an amount of polypeptide that binds to the binding agent; and

(c)   comparing the amount of polypeptide to a predetermined cut-off value, and therefrom determining the presence or absence of a cancer in the patient.

59.   A method according to claim 58, wherein the binding agent is an antibody.

60.   A method according to claim 59, wherein the antibody is a monoclonal antibody.

61.   A method according to claim 58, wherein the cancer is prostate cancer.

62.   A method for monitoring the progression of a cancer in a patient, comprising the steps of:

(a)   contacting a biological sample obtained from a patient at a first point in time with a binding agent that binds to a prostate tumor protein, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs:1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472, or a complement of any of the foregoing polynucleotides;

(b)   detecting in the sample an amount of polypeptide that binds to the binding agent;

(c)   repeating steps (a) and (b) using a biological sample obtained from the patient at a subsequent point in time; and

(d)   comparing the amount of polypeptide detected in step (c) to the amount detected in step (b) and therefrom monitoring the progression of the cancer in the patient.

63.   A method according to claim 62, wherein the binding agent is an antibody.

64.   A method according to claim 63, wherein the antibody is a monoclonal antibody.

65.   A method according to claim 62, wherein the cancer is a prostate cancer.

66.   A method for determining the presence or absence of a cancer in a patient, comprising the steps of:

(a)   contacting a biological sample obtained from a patient with an oligonucleotide that hybridizes to a polynucleotide that encodes a prostate tumor protein, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs:1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472, or a complement of any of the foregoing polynucleotides;

(b)   detecting in the sample an amount of a polynucleotide that hybridizes to the oligonucleotide; and

(c)   comparing the amount of polynucleotide that hybridizes to the oligonucleotide to a predetermined cut-off value, and therefrom determining the presence or absence of a cancer in the patient.

67.   A method according to claim 66, wherein the amount of polynucleotide that hybridizes to the oligonucleotide is determined using a polymerase chain reaction.

68.   A method according to claim 66, wherein the amount of polynucleotide that hybridizes to the oligonucleotide is determined using a hybridization assay.

69.   A method for monitoring the progression of a cancer in a patient, comprising the steps of:

(a)   contacting a biological sample obtained from a patient with an oligonucleotide that hybridizes to a polynucleotide that encodes a prostate tumor

protein, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs:1-111, 115-171, 173-175, 177, 179-305, 307-315, 326, 328, 330, 332-335, 340-375, 381, 382 or 384-472, or a complement of any of the foregoing polynucleotides;

(b)   detecting in the sample an amount of a polynucleotide that hybridizes to the oligonucleotide;

(c)   repeating steps (a) and (b) using a biological sample obtained from the patient at a subsequent point in time; and

(d)   comparing the amount of polynucleotide detected in step (c) to the amount detected in step (b) and therefrom monitoring the progression of the cancer in the patient.

70.   A method according to claim 69, wherein the amount of polynucleotide that hybridizes to the oligonucleotide is determined using a polymerase chain reaction.

71.   A method according to claim 69, wherein the amount of polynucleotide that hybridizes to the oligonucleotide is determined using a hybridization assay.

72.   A diagnostic kit, comprising:

(a)   one or more antibodies according to claim 21; and

(b)   a detection reagent comprising a reporter group.

73.   A kit according to claim 72, wherein the antibodies are immobilized on a solid support.

74.   A kit according to claim 73, wherein the solid support comprises nitrocellulose, latex or a plastic material.

75. A kit according to claim 72, wherein the detection reagent comprises an anti-immunoglobulin, protein G, protein A or lectin.

76. A kit according to claim 72, wherein the reporter group is selected from the group consisting of radioisotopes, fluorescent groups, luminescent groups, enzymes, biotin and dye particles.

77. An oligonucleotide comprising 10 to 40 nucleotides that hybridize under moderately stringent conditions to a polynucleotide that encodes a prostate tumor protein, wherein the tumor protein comprises an amino acid sequence that is encoded by a polynucleotide sequence recited in any one of SEQ ID NOs:2, 3, 8-29, 41-45, 47-52, 54-65, 70, 73-74, 79, 81, 87, 90, 92, 93, 97, 103, 104, 107, 109-111, 115-160, 171, 173-175, 177, 181, 188, 191, 193, 194, 198, 203, 204, 207, 209, 220, 222-225, 227-305, 307-315, 326, 328, 330, 332, 334, 350-365, 381, 382, 384, 386, 389, 390, 392, 393, 396, 401, 402, 407, 408, 410, 413, 415-419, 422, 426, 427, 432, 434, 435, 442-444, 446, 450, 452, 453, 459-461, 468-471 or 472, or a complement of any of the foregoing polynucleotides.

78. A oligonucleotide according to claim 77, wherein the oligonucleotide comprises 10-40 nucleotides recited in any one of SEQ ID NOs:2, 3, 8-29, 41-45, 47-52, 54-65, 70, 73-74, 79, 81, 87, 90, 92, 93, 97, 103, 104, 107, 109-111, 115-160, 171, 173-175, 177, 181, 188, 191, 193, 194, 198, 203, 204, 207, 209, 220, 222-225, 227-305, 307-315, 326, 328, 330, 332, 334, 350-365, 381, 382, 384, 386, 389, 390, 392, 393, 396, 401, 402, 407, 408, 410, 413, 415-419, 422, 426, 427, 432, 434, 435, 442-444, 446, 450, 452, 453, 459-461, 468-471 or 472.

79. A diagnostic kit, comprising:

(a) an oligonucleotide according to claim 77; and

(b) a diagnostic reagent for use in a polymerase chain reaction or hybridization assay.

Fig. 1

Fig. 2A

Fig. 2B

Fig. 3

4/6
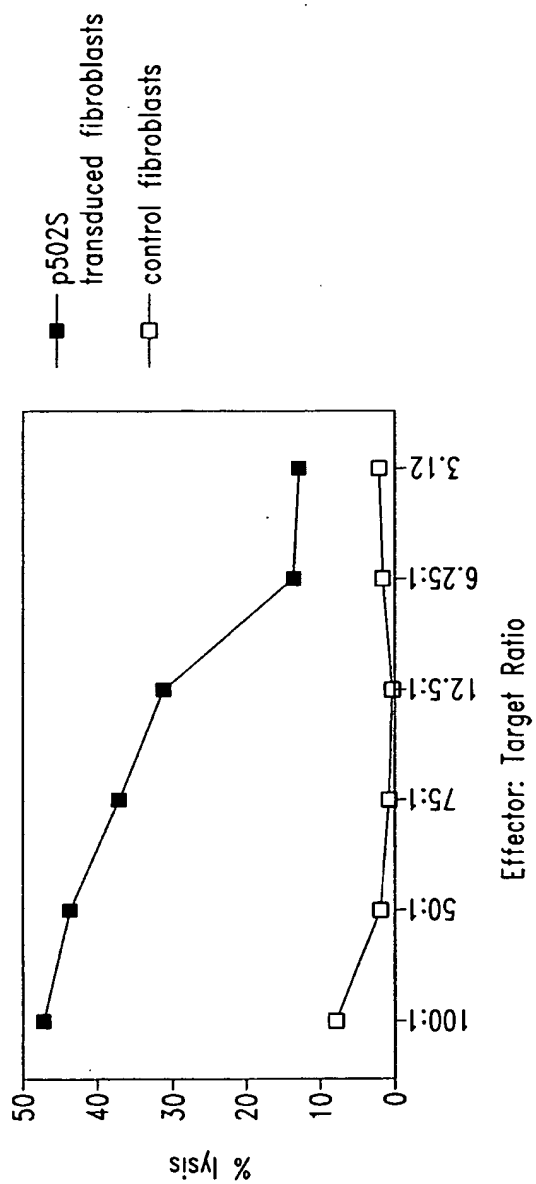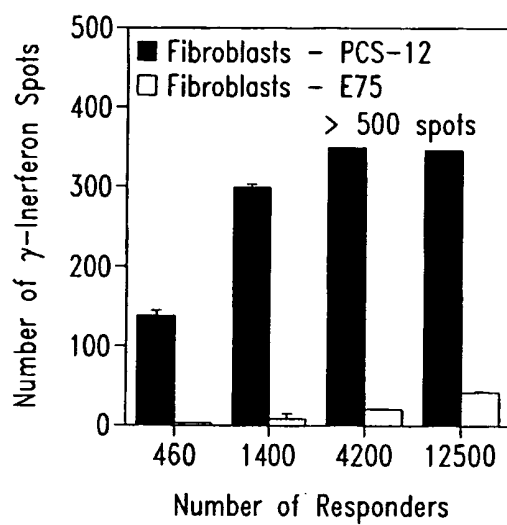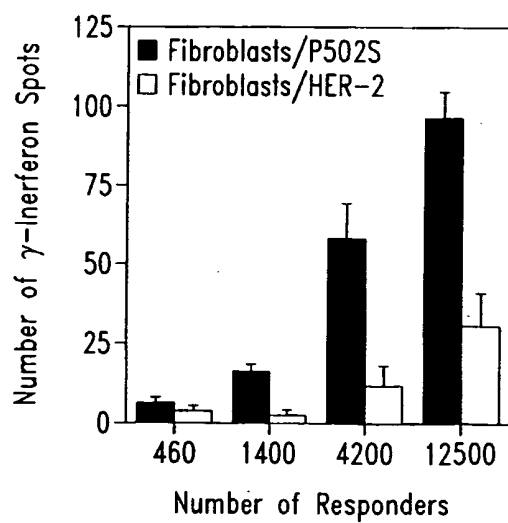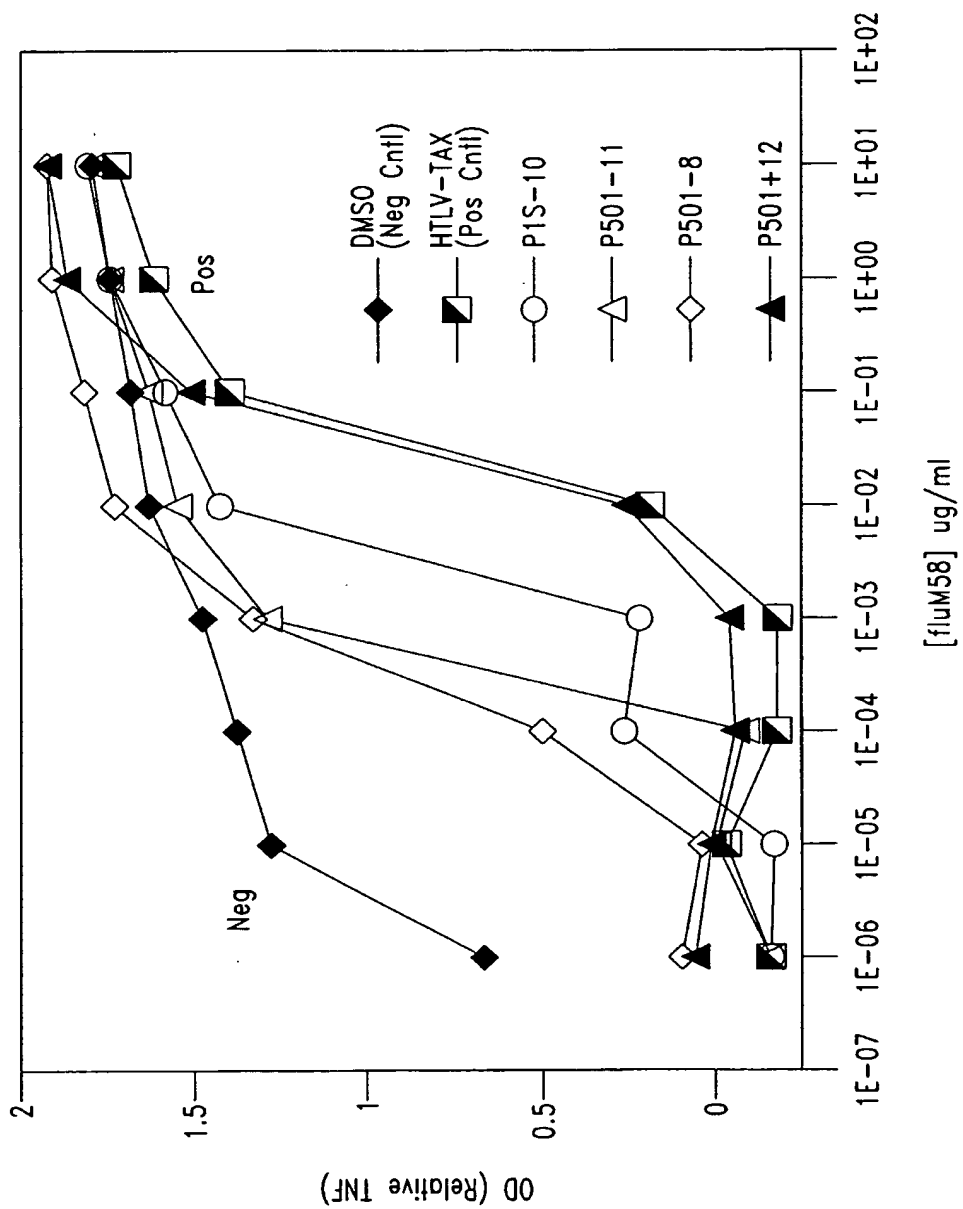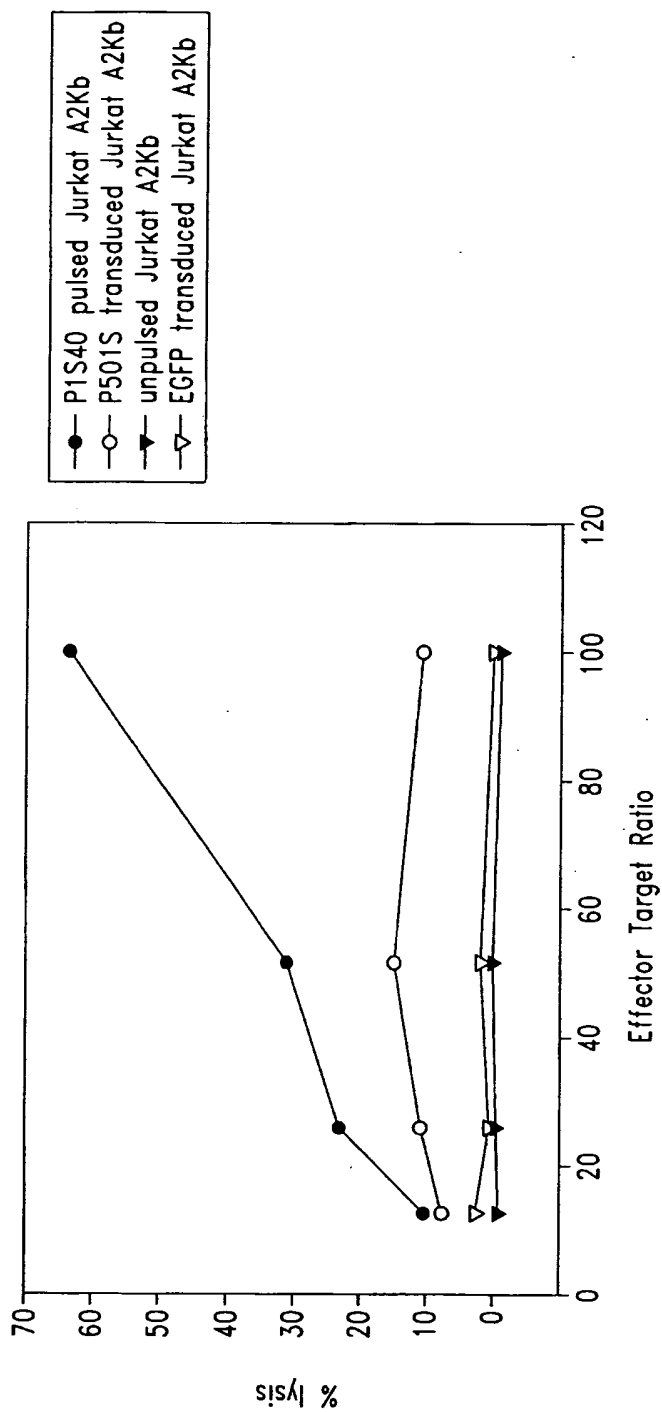
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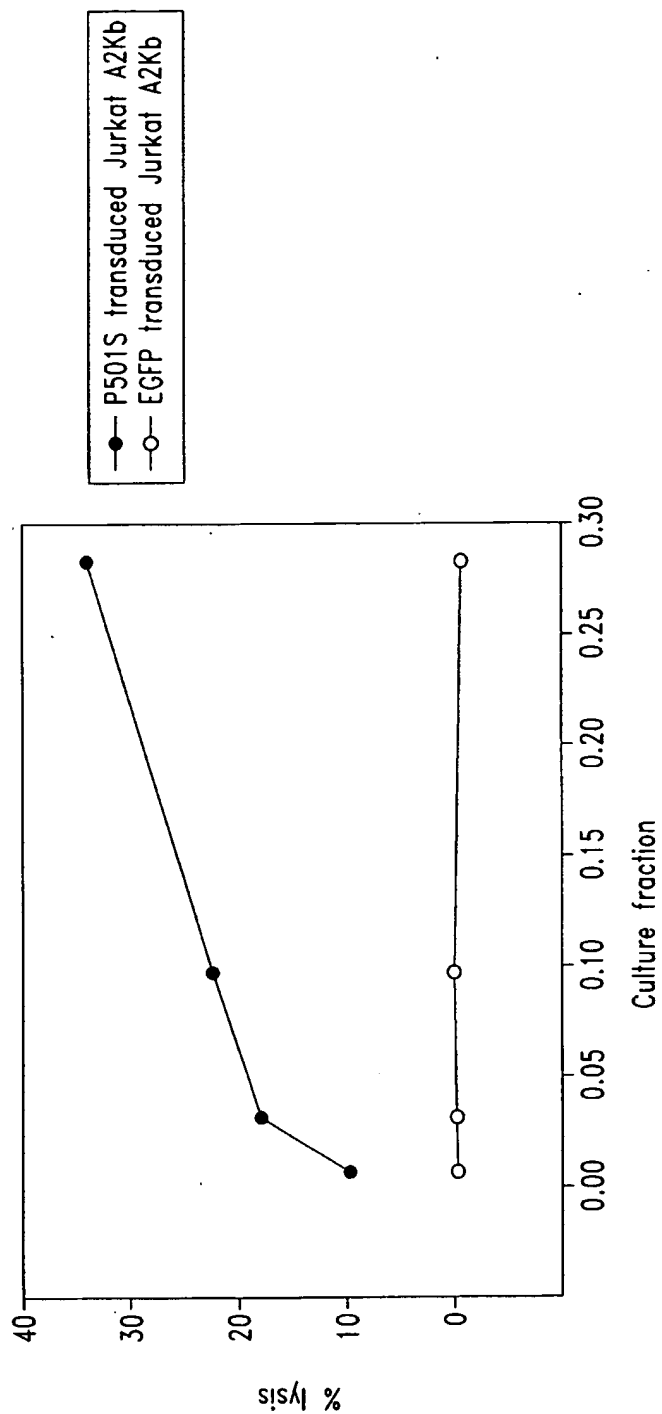
Fig. 5

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Fig. 6A

Fig. 6B

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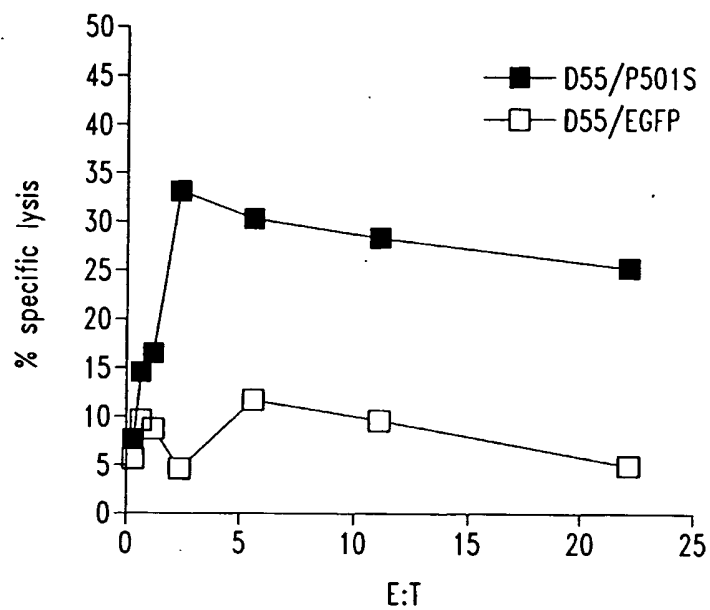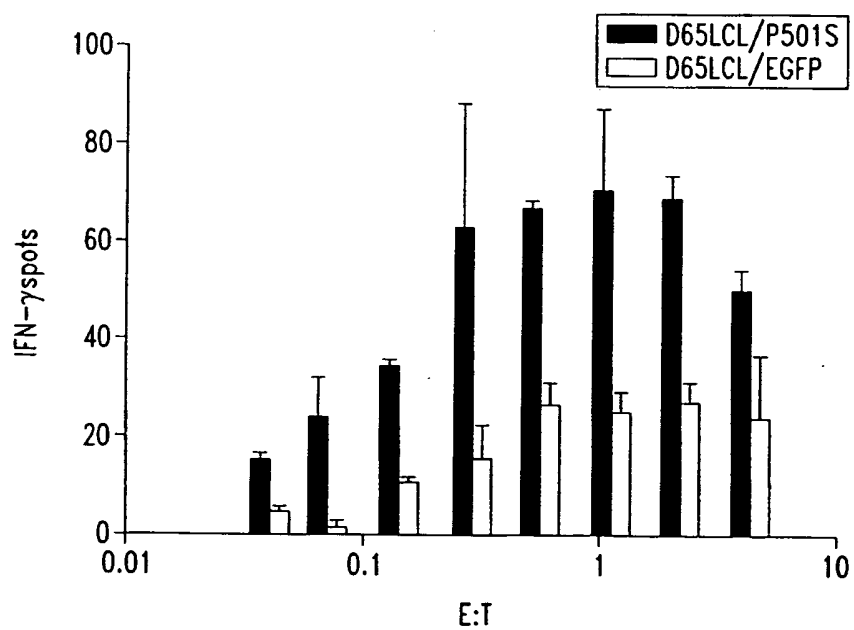
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cttttgaaag aagggatggc tggggtgttt aacagcagag gtgcagggcg ggggctcacg      60
tcctgctcct cactggtgat aaacgagccc cgttccttgt tgtgatcatg atgaacaacc     120
tcctcaaaag tcagaaccgg agtcacacag gcatctgtgc cgtcaaagat ttgacaccac     180
tctgccttcg tcttctttgc aaatacatct gcaaacttct tcttcatttc tggccaatca     240
tccatgctca tctgattggg aagttcatca gactttagtc canntccttt gatcagcagc     300
tcgtagaact ggggttctat tgctccaaca gccatgaatt ccccatctgc tgtcctgtaa     360
gtcgtataga aaggtgctcc accatccaac atgttctgtc ctcgaggggg ggcccggtac     420
ccaattcgcc ctatantgag tcgtattacg cgcgctcact ggccgtcgtt ttacaacgtc     480
gtgactggga aaaccctggg cgttaccaac ttaatcgcct tgcagcacat ccccctttcg     540
ccagctgggc gtaatancga aaaggcccgc accgatcgcc cttccaacag ttgcgcacct     600
gaatgggnaa atgggacccc cctgttaccg cgcattnaac ccccgcnggg tttngttgtt     660
acccccacnt nnaccgctta cactttgcca gcgccttanc gcccgctccc tttcnccttt     720
cttcccttcc tttcncnccn ctttcccccg gggtttcccc cntcaaaccc cna            773
```

        <210> 4
        <211> 828
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(828)
        <223> n = A,T,C or G

        <400> 4

```
cctcctgagt cctactgacc tgtgctttct ggtgtggagt ccagggctgc taggaaaagg      60
aatgggcaga cacaggtgta tgccaatgtt tctgaaatgg gtataatttc gtcctctcct     120
tcggaacact ggctgtctct gaagacttct cgctcagttt cagtgaggac acacacaaag     180
acgtgggtga ccatgttgtt tgtggggtgc agagatggga ggggtggggc ccaccctgga     240
agagtggaca gtgacacaag gtggacactc tctacagatc actgaggata agctggagcc     300
acaatgcatg aggcacacac acagcaagga tgacnctgta aacatagccc acgctgtcct     360
gngggcactg ggaagcctan atnaggccgt gagcanaaag aaggggagga tccactagtt     420
ctanagcggc cgccaccgcg gtgganctcc ancttttgtt ccctttagtg agggttaatt     480
gcgcgcttgg cntaatcatg gtcatanctn tttcctgtgt gaaattgtta tccgctcaca     540
attccacaca acatacganc cggaaacata aantgtaaac ctgggtgcc taatgantga     600
ctaactcaca ttaattgcgt tgcgctcact gcccgctttc caatcnggaa acctgtcttg     660
ccncttgcat tnatgaatcn gccaccccc ggggaaaagc gtttgcgttt tgggcgctct     720
tccgcttcct cnctcantta ntccctncnc tcggtcattc cggctgcngc aaaccggttc     780
accncctcca aaggggggtat tccggtttcc ccnaatccgg gganancc                 828
```

        <210> 5
        <211> 834
        <212> DNA
        <213> Homo sapien

3

```
        <220>
        <221> misc_feature
        <222> (1)...(834)
        <223> n = A,T,C or G

        <400> 5
tttttttttt tttttactga tagatggaat ttattaagct tttcacatgt gatagcacat      60
agttttaatt gcatccaaag tactaacaaa aactctagca atcaagaatg gcagcatgtt     120
attttataac aatcaacacc tgtggctttt aaaatttggt tttcataaga taatttatac     180
tgaagtaaat ctagccatgc ttttaaaaaa tgctttaggt cactccaagc ttggcagtta     240
acatttggca taaacaataa taaaacaatc acaatttaat aaataacaaa tacaacattg     300
taggccataa tcatatacag tataaggaaa aggtggtagt gttgagtaag cagttattag     360
aatagaatac cttggcctct atgcaaatat gtctagacac tttgattcac tcagccctga     420
cattcagttt tcaaagtagg agacaggttc tacagtatca ttttacagtt tccaacacat     480
tgaaaacaag tagaaaatga tgagttgatt tttattaatg cattcatcc tcaagagtta     540
tcaccaaccc ctcagttata aaaaattttc aagttatatt agtcatataa cttggtgtgc     600
ttattttaaa ttagtgctaa atggattaag tgaagacaac aatggtcccc taatgtgatt     660
gatattggtc atttttacca gcttctaaat ctnaactttc aggcttttga actggaacat     720
tgnatnacag tgttccanag ttncaaccta ctggaacatt acagtgtgct tgattcaaaa     780
tgttattttg ttaaaaatta aattttaacc tggtggaaaa ataatttgaa atna           834

        <210> 6
        <211> 818
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(818)
        <223> n = A,T,C or G

        <400> 6
tttttttttt tttttttttt aagaccctca tcaatagatg gagacataca gaaatagtca      60
aaccacatct acaaaatgcc agtatcaggc ggcggcttcg aagccaaagt gatgtttgga     120
tgtaaagtga aatattagtt ggcggatgaa gcagatagtg aggaaagttg agccaataat     180
gacgtgaagt ccgtggaagc ctgtggctac aaaaaatgtt gagccgtaga tgccgtcgga     240
aatggtgaag ggagactcga agtactctga ggcttgtagg agggtaaaat agagacccag     300
taaaattgta ataagcagtg cttgaattat ttggtttcgg ttgttttcta ttagactatg     360
gtgagctcag gtgattgata ctcctgatgc gagtaatacg gatgtgttta ggagtgggac     420
ttctagggga tttagcgggg tgatgcctgt tgggggccag tgccctccta gttggggggt     480
aggggctagg ctggagtggt aaaaggctca gaaaaatcct gcgaagaaaa aaacttctga     540
ggtaataaat aggattatcc cgtatcgaag gcctttttgg acaggtggtg tgtggtggcc     600
ttggtatgtg ctttctcgtg ttacatcgcg ccatcattgg tatatggtta gtgtgtttggg     660
ttantanggc ctantatgaa gaacttttgg antggaatta aatcaatngc ttggccggaa     720
gtcattanga nggctnaaaa ggccctgtta ngggtctggg ctnggtttta cccnacccat     780
ggaatncncc ccccggacna ntgnatccct attcttaa                              818

        <210> 7
        <211> 817
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(817)
        <223> n = A,T,C or G

        <400> 7
tttttttttt tttttttttt tggctctaga gggggtagag ggggtgctat agggtaaata      60
cgggccctat ttcaaagatt tttaggggaa ttaattctag gacgatgggg atgaaactgt     120
ggtttgctcc acagatttca gagcattgac cgtagtatac ccccggtcgt gtagcggtga     180
```

4

```
aagtggtttg gtttagacgt ccgggaattg catctgtttt taagcctaat gtggggacag    240
ctcatgagtg caagacgtct tgtgatgtaa ttattatacn aatgggggct tcaatcggga    300
gtactactcg attgtcaacg tcaaggagtc gcaggtcgcc tggttctagg aataatgggg    360
gaagtatgta ggaattgaag attaatccgc cgtagtcggt gttctcctag gttcaatacc    420
attggtggcc aattgatttg atggtaaggg gagggatcgt tgaactcgtc tgttatgtaa    480
aggatncctt ngggatggga aggcnatnaa ggactangga tnaatggcgg gcangatatt    540
tcaaacngtc tctanttcct gaaacgtctg aaatgttaat aanaattaan tttngttatt    600
gaatnttnng gaaaagggct tacaggacta gaaaccaaat angaaaanta atnntaangg    660
cnttatcntn aaaggtnata accnctccta tnatcccacc caatngnatt ccccacncnn    720
acnattggat ncccanttc canaaanggc cnccccggg tgnannccnc cttttgttcc    780
cttnantgan ggttattcnc ccctngcntt atcancc                              817
```

```
    <210> 8
    <211> 799
    <212> DNA
    <213> Homo sapien

    <220>
    <221> misc_feature
    <222> (1)...(799)
    <223> n = A,T,C or G
```

```
    <400> 8
catttccggg tttactttct aaggaaagcc gagcggaagc tgctaacgtg ggaatcggtg    60
cataaggaga actttctgct ggcacgcgct agggacaagc gggagagcga ctccgagcgt    120
ctgaagcgca cgtcccagaa ggtggacttg gcactgaaac agctgggaca catccgcgag    180
tacgaacagc gcctgaaagt gctggagcgg gaggtccagc agtgtagccg cgtcctgggg    240
tgggtggccg angcctganc cgctctgcct tgctgccccc angtgggccg ccaccccctg    300
acctgcctgg gtccaaacac tgagccctgc tggcggactt caagganaac ccccacangg    360
ggattttgct cctanantaa ggctcatctg ggcctcggcc cccccacctg gttggccttg    420
tctttgangt gagccccatg tccatctggg ccactgtcng gaccaccttt ngggagtgtt    480
ctccttacaa ccacannatg cccggctcct cccggaaacc antcccancc tgngaaggat    540
caagncctgn atccactnnt nctanaaccg gccnccnccg cngtggaacc cnccttntgt    600
tccttttcnt tnaggttaa tnncgccttg gccttnccan ngtcctncnc nttttccnnt    660
gttnaaattg ttangcnccc nccnntcccn cnncnncnan cccgacccnn annttnnann    720
ncctgggggt nccnncngat tgacccnncc nccctntant tgcnttnggg nncnntgccc    780
ctttccctct ngggannceg                                                 799
```

```
    <210> 9
    <211> 801
    <212> DNA
    <213> Homo sapien

    <220>
    <221> misc_feature
    <222> (1)...(801)
    <223> n = A,T,C or G
```

```
    <400> 9
acgccttgat cctcccaggc tgggactggt tctgggagga gccgggcatg ctgtggtttg    60
taangatgac actcccaaag gtggtcctga cagtggccca gatggacatg gggctcacct    120
caaggacaag gccaccaggt gcggggccg aagcccacat gatccttact ctatgagcaa    180
aatcccctgt ggggcttct ccttgaagtc cgccancagg gctcagtctt tggacccang    240
caggtcatgg ggttgtngnc caactgggnc cncaacgca aaanggcnca gggcctcngn    300
cacccatccc angacgcggc tacactnctg gacctcccnc tccaccactt tcatcgctg    360
ttcntacccg cgnatntgtc ccanctgttt cngtgccnac tccancttct nggacgtgcg    420
ctacatacgc ccggantcnc nctcccgctt tgtccctatc cacgtnccan caacaaattt    480
cnccntantg caccnattcc cacntttnnc agntttccnc nncgngcttc cttntaaaag    540
ggttganccc cggaaaatnc cccaaggggg gggggccngg tacccaactn ccccctnata    600
gctgaantcc ccatnaccnn gnctcnatgg anccntccnt tttaannacn ttctnaactt    660
gggaanancc ctcgncccntn ccccccnttaa tcccnccttg cnangnncnt ccccccnntcc    720
ncccnnntng gcntntnann cnaaaaaggc ccnnnancaa tctcctnncn cctcanttcg    780
```

```
ccancccctcg aaatcggccn c                                                    801
```

```
        <210> 10
        <211> 789
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(789)
        <223> n = A,T,C or G

        <400> 10
cagtctatnt ggccagtgtg gcagctttcc ctgtggctgc cggtgccaca tgcctgtccc          60
acagtgtggc cgtggtgaca gcttcagccg ccctcaccgg gttcaccttc tcagccctgc         120
agatcctgcc ctacacactg gcctccctct accaccggga gaagcaggtg ttcctgccca         180
aataccgagg ggacactgga ggtgctagca gtgaggacag cctgatgacc agcttcctgc         240
caggccctaa gcctggagct cccttcccta atggacacgt gggtgctgga ggcagtggcc         300
tgctcccacc tccacccgcg ctctgcgggg cctctgcctg tgatgtctcc gtacgtgtgg         360
tggtgggtga gcccaccgan gccagggtgg ttccgggccg gggcatctgc ctggacctcg         420
ccatcctgga tagtgcttcc tgctgtccca ngtggcccca tccctgttta tgggctccat         480
tgtccagctc agccagtctg tcactgccta tatggtgtct gccgcaggcc tgggtctggt         540
cccatttact ttgctacaca ggtantattt gacaagaacg anttggccaa atactcagcg         600
ttaaaaaatt ccagcaacat tgggggtgga aggcctgcct cactgggtcc aactccccgc         660
tcctgttaac cccatggggc tgccggcttg ccgccaatt tctgttgctg ccaaantnat          720
gtggctctct gctgccacct gttgctggct gaagtgcnta cngcncanct nggggggtng         780
ggngttccc                                                                  789
```

```
        <210> 11
        <211> 772
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(772)
        <223> n = A,T,C or G

        <400> 11
cccaccctac ccaaatatta gacaccaaca cagaaaagct agcaatggat tcccttctac          60
tttgttaaat aaataagtta aatatttaaa tgcctgtgtc tctgtgatgg caacagaagg         120
accaacaggc cacatcctga taaaaggtaa gagggggggtg gatcagcaaa aagacagtgc         180
tgtgggctga ggggaccctgg ttcttgtgtg ttgcccctca ggactcttcc cctacaaata        240
actttcatat gttcaaatcc catggaggag tgtttcatcc tagaaactcc catgcaagag         300
ctacattaaa cgaagctgca ggttaagggg cttanagatg ggaaaccagg tgactgagtt         360
tattcagctc ccaaaaaccc ttctctaggt gtgtctcaac taggaggcta gctgttaacc         420
ctgagcctgg gtaatccacc tgcagagtcc ccgcattcca gtgcatggaa cccttctggc         480
ctccctgtat aagtccagac tgaaaccccc ttggaaggnc tccagtcagg cagccctana         540
aactggggaa aaaagaaaag gacgccccan ccccccagctg tgcanctacg cacctcaaca        600
gcacaggggtg gcagcaaaaa aaccactttta ctttggcaca aacaaaaact ngggggggca       660
accccggcac cccnannggg gttaacagga anncgggnaa cntggaaccc aattnaggca         720
ggcccnccac cccnaatntt gctgggaaat ttttcctccc ctaaattntt tc                 772
```

```
        <210> 12
        <211> 751
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(751)
        <223> n = A,T,C or G
```

6

```
        <400> 12
gccccaattc cagctgccac accacccacg gtgactgcat tagttcggat gtcatacaaa     60
agctgattga agcaaccctc tacttttggg tcgtgagcct tttgcttggt gcaggtttca    120
ttggctgtgt tggtgacgtt gtcattgcaa cagaatgggg gaaaggcact gttctctttg    180
aagtanggtg agtcctcaaa atccgtatag ttggtgaagc cacagcactt gagcccttc     240
atggtggtgt tccacacttg agtgaagtct tcctgggaac cataatcttt cttgatggca    300
ggcactacca gcaacgtcag ggaagtgctc agccattgtg gtgtacacca aggcgaccac    360
agcagctgcn acctcagcaa tgaagatgan gaggangatg aagaagaacg tcncgagggc    420
acacttgctc tcagtcttan caccatanca gcccntgaaa accaananca aagaccacna    480
cnccggctgc gatgaagaaa tnaccccncg ttgacaaact tgcatggcac tggganccac    540
agtggcccna aaaatcttca aaaaggatgc cccatcnatt gaccccccaa atgcccactg    600
ccaacagggg ctgccccacn cncnnaacga tganccnatt gnacaagatc tncntggtct    660
tnatnaacnt gaaccctgcn tngtggctcc tgttcaggnc cnnggcctga cttctnaann    720
aangaactcn gaagnccca cngganannc g                                    751

        <210> 13
        <211> 729
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(729)
        <223> n = A,T,C or G

        <400> 13
gagccaggcg tccctctgcc tgcccactca gtggcaacac ccgggagctg ttttgtcctt     60
tgtggancct cagcagtncc ctctttcaga actcantgcc aagancctg aacaggagcc     120
accatgcagt gcttcagctt cattaagacc atgatgatcc tcttcaattt gctcatcttt    180
ctgtgtggtg cagccctgtt ggcagtgggc atctgggtgt caatcgatgg ggcatccttt    240
ctgaagatct tcgggccact gtcgtccagt gccatgcagt ttgtcaacgt gggctacttc    300
ctcatcgcag ccggcgttgt ggtcttagct ctaggtttcc tgggctgcta tggtgctaag    360
actgagagca agtgtgccct cgtgacgttc ttcttcatcc tcctcctcat cttcattgct    420
gaggttgcaa tgctgtggtc gccttggtgt acaccacaat ggctgagcac ttcctgacgt    480
tgctggtaat gcctgccatc aanaaaagat tatgggttcc caggaanact tcactcaagt    540
gttggaacac caccatgaaa gggctcaagt gctgtggctt cnnccaacta tacggatttt    600
gaagantcac ctacttcaaa gaaaanagtg cctttccccc atttctgttg caattgacaa    660
acgtccccaa cacagccaat tgaaaacctg cacccaaccc aaangggtcc ccaaccanaa    720
attnaaggg                                                            729

        <210> 14
        <211> 816
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(816)
        <223> n = A,T,C or G

        <400> 14
tgctcttcct caaagttgtt cttgttgcca taacaaccac cataggtaaa gcgggcgcag     60
tgttcgctga aggggttgta gtaccagcgc gggatgctct ccttgcagag tcctgtgtct    120
ggcaggtcca cgcagtgccc tttgtcactg gggaaatgga tgcgctggag ctcgtcaaag    180
ccactcgtgt attttttcaca ggcagcctcg tccgacgcgt cggggcagtt ggggtgtct    240
tcacactcca ggaaactgtc natgcagcag ccattgctgc agcggaactg ggtgggctga    300
cangtgccag agcacactgg atggcgcctt tccatgnnan gggccctgng ggaaagtccc    360
tgancccan anctgcctct caaangcccc accttgcaca ccccgacagg ctagaatgga    420
atcttcttcc cgaaaggtag ttnttcttgt tgcccaancc anccccntaa acaaactctt    480
gcanatctgc tccgnggggg tcntantacc ancgtgggaa aagaacccca ggcngcgaac    540
caancttgtt tggatncgaa gcnataatct nctnttctgc ttggtggaca gcaccantna    600
```

```
ctgtnnanct ttagnccntg gtcctcntgg gttgnncttg aacctaatcn ccnntcaact      660
gggacaaggt aantngccnt cctttnaatt cccnancntn ccccctggtt tggggtttttn     720
cncnctccta ccccagaaan nccgtgttcc cccccaacta ggggccnaaa ccnnttnttc      780
cacaaccctn ccccacccac gggttcngnt ggttng                               816
```

        <210> 15
        <211> 783
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(783)
        <223> n = A,T,C or G

        <400> 15
```
ccaaggcctg ggcaggcata nacttgaagg tacaaccccca ggaacccctg gtgctgaagg     60
atgtggaaaa cacagattgg cgcctactgc ggggtgacac ggatgtcagg gtagagagga     120
aagacccaaa ccaggtggaa ctgtgggggac tcaaggaang cacctacctg ttccagctga     180
cagtgactag ctcagaccac ccagaggaca cggccaacgt cacagtcact gtgctgtcca     240
ccaagcagac agaagactac tgcctcgcat ccaacaangt gggtcgctgc cggggctctt     300
tcccacgctg gtactatgac cccacggagc agatctgcaa gagtttcgtt tatggaggct     360
gcttgggcaa caagaacaac taccttcggg aagaagagtg cattctancc tgtcngggtg     420
tgcaaggtgg gcctttgana ngcanctctg gggctcangc gactttcccc cagggcccct     480
ccatggaaag gcgccatcca ntgttctctg gcacctgtca gcccacccag ttccgctgca     540
ncaatggctg ctgcatcnac antttcctng aattgtgaca acacccccca ntgcccccaa     600
ccctcccaac aaagcttccc tgttnaaaaa tacnccantt ggctttnac aaacncccgg       660
cncctccntt ttccccnntn aacaaagggc nctngcnttt gaactgcccn aacccnggaa     720
tctnccnngg aaaaantncc ccccctggtt cctnnaancc cctccncnaa anctnccccc     780
ccc                                                                   783
```

        <210> 16
        <211> 801
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(801)
        <223> n = A,T,C or G

        <400> 16
```
gccccaattc cagctgccac accacccacg gtgactgcat tagttcggat gtcatacaaa     60
agctgattga agcaaccctc tactttttgg tcgtgagcct tttgcttggt gcaggtttca     120
ttggctgtgt tggtgacgtt gtcattgcaa cagaatgggg gaaaggcact gttctctttg     180
aagtagggtg agtcctcaaa atccgtatag ttggtgaagc cacagcactt gagccctttc     240
atggtggtgt tccacacttg agtgaagtct tcctgggaac cataatcttt cttgatggca     300
ggcactacca gcaacgtcag gaagtgctca gccattgtgg tgtacaccaa ggcgaccaca     360
gcagctgcaa cctcagcaat gaagatgagg aggaggatga agaagaacgt cncgagggca     420
cacttgctct ccgtcttagc accatagcag cccangaaac caagagcaaa gaccacaacg     480
ccngctgcga atgaaagaaa ntacccacgt tgacaaactg catggccact ggacgacagt     540
tggcccgaan atcttcagaa aagggatgcc ccatcgattg aacacccana tgcccactgc     600
cnacagggct gcnccncncn gaaagaatga gccattgaag aaggatcntc ntggtcttaa     660
tgaactgaaa ccntgcatgg tggcccctgt tcagggctct tggcagtgaa ttctganaaa     720
aaggaacngc ntnagccccc ccaaangana aaacacccccc gggtgttgcc ctgaattggc     780
ggccaaggan ccctgcccccn g                                              801
```

        <210> 17
        <211> 740
        <212> DNA
        <213> Homo sapien

8

```
<220>
<221> misc_feature
<222> (1)...(740)
<223> n = A,T,C or G

<400> 17
gtgagagcca ggcgtccctc tgcctgccca ctcagtggca acacccggga gctgttttgt      60
cctttgtgga gcctcagcag ttccctcttt cagaactcac tgccaagagc cctgaacagg     120
agccaccatg cagtgcttca gcttcattaa gaccatgatg atcctcttca atttgctcat     180
ctttctgtgt ggtgcagccc tgttggcagt gggcatctgg gtgtcaatcg atggggcatc     240
ctttctgaag atcttcgggc cactgtcgtc cagtgccatg cagtttgtca acgtgggcta     300
cttcctcatc gcagccggcg ttgtggtctt tgctcttggt ttcctgggct gctatggtgc     360
taagacggag agcaagtgtg ccctcgtgac gttcttcttc atcctcctcc tcatcttcat     420
tgctgaagtt gcagctgctg tggtcgcctt ggtgtacacc acaatggctg aaccattcct     480
gacgttgctg gtantgcctg ccatcaanaa agattatggg ttcccaggaa aaattcactc     540
aantntggaa caccnccatg aaaagggctc caatttctgn tggcttcccc aactataccg     600
gaattttgaa agantcnccc tacttccaaa aaaaaanant tgcctttncc cccnttctgt     660
tgcaatgaaa acntcccaan acngccaatn aaaacctgcc cnnncaaaaa ggntcncaaa     720
caaaaaaant nnaagggttn                                                 740
```

```
<210> 18
<211> 802
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(802)
<223> n = A,T,C or G

<400> 18
ccgctggttg cgctggtcca gngnagccac gaagcacgtc agcatacaca gcctcaatca      60
caaggtcttc cagctgccgc acattacgca gggcaagagc ctccagcaac actgcatatg     120
ggatacactt tactttagca gccagggtga caactgagag gtgtcgaagc ttattcttct     180
gagcctctgt tagtggagga agattccggg cttcagctaa gtagtcagcg tatgtcccat     240
aagcaaacac tgtgagcagc cggaaggtag aggcaaagtc actctcagcc agctctctaa     300
cattgggcat gtccagcagt tctccaaaca cgtagacacc agnggcctcc agcacctgat     360
ggatgagtgt ggccagcgct gcccccttgg ccgacttggc taggagcaga aattgctcct     420
ggttctgccc tgtcaccttc acttccgcac tcatcactgc actgagtgtg ggggacttgg     480
gctcaggatg tccagagacg tggttccgcc ccctcnctta atgacaccgn ccanncaacc     540
gtcggctccc gccgantgng ttcgtcgtnc ctgggtcagg gtctgctggc cnctacttgc     600
aancttcgtc nggcccatgg aattcaccnc accggaactn gtangatcca ctnnttctat     660
aaccggncgc caccgcnnnt ggaactccac tcttnttncc tttacttgag ggttaaggtc     720
acccttnncg ttaccttggt ccaaaccntn ccntgtgtcg anatngtnaa tcnggnccna     780
tnccanccnc atangaagcc ng                                              802
```

```
<210> 19
<211> 731
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(731)
<223> n = A,T,C or G

<400> 19
cnaagcttcc aggtnacggg ccgcnaancc tgacccnagg tancanaang cagncngcgg      60
gagcccaccg tcacgnggng gngtctttat nggaggggggc ggagccacat cnctggacnt     120
cntgaccoca actccccncc ncncantgca gtgatgagtg cagaactgaa ggtnacgtgg     180
caggaaccaa gancaaannc tgctccnntc caagtcggcn naggggggcgg ggctggccac     240
gcncatccnt cnagtgctgn aaagccccnn cctgtctact tgtttggaga acngcnnnga     300
```

9

```
catgcccagn gttanataac nggcngagag tnantttgcc tctcccttcc ggctgcgcan    360
cgngtntgct tagnggacat aacctgacta cttaactgaa cccnngaatc tnccncccct    420
ccactaagct cagaacaaaa aacttcgaca ccactcantt gtcacctgnc tgctcaagta    480
aagtgtaccc catncccaat gtntgctnga ngctctgncc tgcnttangt tcggtcctgg    540
gaagacctat caattnaagc tatgtttctg actgcctctt gctccctgna acaancnacc    600
cnncnntcca agggggggnc ggcccccaat ccccccaacc ntnaattnan tttanccccn    660
ccccngggcc cggccttta cnancntcnn nnacngggna aaaccnnngc tttncccaac    720
nnaatccncc t                                                          731
```

```
        <210> 20
        <211> 754
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(754)
        <223> n = A,T,C or G

        <400> 20
tttttttttt tttttttttt taaaaacccc ctccattnaa tgnaaacttc cgaaattgtc     60
caacccctc ntccaaatnn ccntttccgg gnggggggttc caaacccaan ttanntttgg    120
annttaaatt aaatnttnnt tggnggnnna anccnaatgt nangaaagtt naacccanta    180
tnancttnaa tncctggaaa ccngtngntt ccaaaaatnt ttaaccctta antccctccg    240
aaatngttna nggaaaaccc aanttctcnt aaggttgttt gaaggntnaa tnaaaanccc    300
nnccaattgt ttttngccac gcctgaatta attggnttcc gntgttttcc nttaaaanaa    360
ggnnancccc ggttantnaa tcccccccnnc cccaattata ccganttttt ttngaattgg    420
ganccccgg gaattaacgg ggnnnntccc tnttggggggg cnggnncccc ccccntcggg    480
ggttngggnc aggncnnaat tgtttaaggg tccgaaaaat ccctccnaga aaaaaanctc    540
ccaggntgag nntngggttt nccccccccc canggcccct ctcgnanagt tggggtttgg    600
ggggcctggg attttntttc ccctnttncc tccccccccc ccnggganag aggttngngt    660
tttgntcnnc ggcccnccn aaganctttn ccganttnan ttaaatccnt gcctnggcga    720
agtccnttgn agggntaaan ggcccctnn cggg                                  754
```

```
        <210> 21
        <211> 755
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(755)
        <223> n = A,T,C or G

        <400> 21
atcancccat gacccnaac nngggaccnc tcanccggnc nnncnaccnc cggccnatca     60
nngtnagnnc actncnnttn natcacnccc cnccnactac gcccncnanc cnacgcncta    120
nncanatncc actganngcg cgangtngan ngagaaanct nataccanag ncaccanacn    180
ccagctgtcc nanaangcct nnnatacngg nnnatccaat ntgnancctc cnaagtattn    240
nncnncanat gattttcctn anccgattac ccntnccccc tancccctcc cccccaacna    300
cgaaggcnct ggnccnaagg nngcgncncc ccgctagntc cccnncaagt cncncnccta    360
aactcanccn nattacncgc ttcntgagta tcactccccg aatctcaccc tactcaactc    420
aaaaaanatcn gatacaaaat aatncaagcc tgnttatnac actntgactg ggtctctatt    480
ttagnggtcc ntnaancntc ctaatacttc cagtctncct tcnccaattt ccnaanggct    540
ctttcngaca gcatntttg gttcccnntt gggttcttan ngaattgccc ttcntngaac    600
gggctcntct tttccttcgg ttanncctggn ttcnnccggc cagttattat ttcccntttt    660
aaattcntnc cntttanttt tggcnttcna aaccccggc cttgaaaacg gcccctggt    720
aaaaggttgt tttganaaaa ttttgtttt gttcc                                  755
```

```
        <210> 22
        <211> 849
        <212> DNA
```

10

<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(849)
<223> n = A,T,C or G

<400> 22
```
ttttttttt ttttagtg tngtcgtgca ggtagaggct tactacaant gtgaanacgt    60
acgctnggan taangcgacc cganttctag gannncncct aaaatcanac tgtgaagatn   120
atcctgnnna cggaanggtc accggnngat nntgctaggg tgnccnctcc cannncnttn   180
cataactcng nggccctgcc caccaccttc ggcggcccng ngnccgggcc cgggtcattn   240
gnnttaaccn cactnngcna ncggtttccn nccccnncng acccnggcga tccggggtnc   300
tctgtcttcc cctgnagncn anaaantggg ccncggnccc ctttacccct nnacaagcca   360
cngccntcta nccncngccc cccctccant nnggggggact gccnanngct ccgttnctng   420
nnaccccnnn gggtncctcg gttgtcgant cnaccgnang ccanggattc cnaaggaagg   480
tgcgttnttg gccctaccc ttcgctncgg nncacccttc ccgacnanga nccgctcccg    540
cncnncgnng cctcncctcg caacacccgc nctcntcngt ncggnnnccc ccccacccgc    600
nccctcncnc ngncgnancn ctccnccncc gtctcannca ccaccccgcc ccgccaggcc    660
ntcanccacn ggnngacnng nagcncnntc gcnccgcgcn gcgncnccct cgcccncngaa   720
ctncntcngg ccantnncgc tcaanccnna cnaaacgccg ctgcgcggcc cgnagcgncc    780
ncctccncga gtcctcccgn cttccnaccc angnnttccn cgaggacacn nnaccccgcc    840
nncangcgg                                                          849
```

<210> 23
<211> 872
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(872)
<223> n = A,T,C or G

<400> 23
```
gcgcaaacta tacttcgctc gnactcgtgc gcctcgctnc tcttttcctc cgcaaccatg    60
tctgacnanc ccgattnggc ngatatcnan aagntcganc agtccaaact gantaacaca   120
cacacncnan aganaaatcc nctgccttcc anagtanacn attgaacnng agaaccangc   180
nggcgaatcg taatnaggcg tgcgccgcca atntgtcncc gtttattntn ccagcntcnc   240
ctnccnaccc tacntcttcn nagctgtcnn accccctngtn cgnacccccc naggtcggga   300
tcgggtttnn nntgaccgng cnnccctcc cccntccat nacgancnc ccgcaccacc    360
nanngcncgc nccccgnnct cttcgccncc ctgtcctntn cccctgtngc ctggcncngn   420
accgcattga ccctcgccnn ctncnngaaa ncgnanacgt ccgggttgnn annancgctg   480
tgggnnngcg tctgcnccgc gttccttccn ncnncttcca ccatcttcnt tacngggtct   540
ccncgccntc tcnnncacnc cctgggacgc tntcctntgc cccccttnac tccccccctt   600
cgncgtgncc cgnccccacc ntcatttnca nacgntcttc acaannncct ggntnnctcc   660
cnancngncn gtcanccnag ggaagggngg ggnnccnntg nttgacgttg nggngangtc   720
cgaanantcc tcnccntcan cnctacccct cgggcgnnct ctcngttncc aacttancaa   780
ntctcccccg ngngcncntc tcagcctcnc ccnccccnct ctctgcantg tnctctgctc   840
tnaccnntac gantnttcgn cnccctcttt cc                                872
```

<210> 24
<211> 815
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(815)
<223> n = A,T,C or G

<400> 24

11

```
gcatgcaagc ttgagtattc tatagngtca cctaaatanc ttggcntaat catggtcnta          .60
nctgncttcc tgtgtcaaat gtatacnaan tanatatgaa tctnatntga caaganngta          120
tcntncatta gtaacaantg tnntgtccat cctgtcngan canattccca tnnattncgn          180
cgcattcncn gcncantatn taatngggaa ntcnnntnnn ncaccnncat ctatcntncc          240
gcnccctgac tggnagagat ggatnanttc tnntntgacc nacatgttca tcttggattn          300
aananccccc cgcngnccac cggttngnng cnagccnntc ccaagacctc ctgtggaggt          360 .
aacctgcgtc aganncatca aacntgggaa acccgcnncc angtnnaagt ngnnncanan          420
gatcccgtcc aggnttnacc atcccttcnc agcgcccct ttngtgcctt anagngnagc          480
gtgtccnanc cnctcaacat ganacgcgcc agnccanccg caattnggca caatgtcgnc          540
gaaccccta gggggantna tncaaanccc caggattgtc cncncangaa atcccncanc          600
cccnccctac ccnnctttgg gacngtgacc aantcccgga gtnccagtcc ggccngnctc          660
ccccaccggt nnccntgggg gggtgaanct cngnntcanc cngncgaggn ntcgnaagga          720
accggncctn ggncgaanng ancnntcnga agngccncnt cgtataaccc cccctcncca          780
nccnacngnt agntcccccc cngggtncgg aangg                                     815
```

        <210> 25
        <211> 775
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(775)
        <223> n = A,T,C or G

        <400> 25
```
ccgagatgtc tcgctccgtg gccttagctg tgctcgcgct actctctctt tctggcctgg          60
aggctatcca gcgtactcca aagattcagg tttactcacg tcatccagca gagaatggaa          120
agtcaaattt cctgaattgc tatgtgtctg ggtttcatcc atccgacatt gaanttgact          180
tactgaagaa tgganagaga attgaaaaag tggagcattc agacttgtct ttcagcaagg          240
actggtcttt ctatctcntg tactacactg aattcacccc .cactgaaaaa gatgagtatg          300
cctgccgtgt gaaccatgtg actttgtcac agcccaagat agttaagtgg gatcgagaca          360
tgtaagcagn cnncatggaa gtttgaagat gccgcatttg gattggatga attccaaatt          420
ctgcttgctt gcnttttaat antgatatgc ntatacaccc tacccttat gncccccaaat          480
tgtaggggtt acatnantgt tcncntngga catgatcttc ctttataant ccnccnttcg          540
aattgcccgt cncccngttn ngaatgtttc cnnaaccacg gttggctccc ccaggtcncc          600
tcttacggaa gggcctgggc cncttttcaa ggttgggggga accnaaaatt tcncttntgc          660
ccncccncca cnntcttgng nncncanttt ggaacccttc cnattcccct tggcctcnna          720
nccttnncta anaaaacttn aaancgtngc naaanntttn acttcccccc ttacc              775
```

        <210> 26
        <211> 820
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(820)
        <223> n = A,T,C or G

        <400> 26
```
anattantac agtgtaatct tttcccagag gtgtgtanag ggaacggggc ctagaggcat          60
cccanagata ncttatanca acagtgcttt gaccaagagc tgctgggcac atttcctgca          120
gaaaaggtgg cggtccccat cactcctcct ctcccatagc catcccagag gggtgagtag          180
ccatcangcc ttcggtggga gggagtcang gaaacaacan accacagagc anacagacca          240
ntgatgacca tgggcgggag cgagcctctt ccctgnaccg gggtggcana nganagccta          300
nctgaggggt cacactataa acgttaacga ccnagatnan cacctgcttc aagtgcaccc          360
ttcctacctg acnaccagng accnnnaact gcngcctggg gacagcnctg ggancagcta          420
acnnagcact cacctgcccc cccatggccg tncgcntccc tggtcctgnc aagggaagct          480
ccctgttgga attncgggga naccaaggga ncccctcct ccanctgtga aggaaaaann          540
gatggaattt tncccttccg gccnntcccc tcttccttta cacgcccct nntactcntc          600
tccctctntt ntcctgncnc acttttnacc ccnnnatttc ccttnattga tcggannctn          660
```

12

ganattccac tnncgcctnc cntcnatcng naanacnaaa nactntctna cccngggggat   720
gggnncctcg ntcatcctct cttttttcnct accnccnntt ctttgcctct ccttngatca
780tccaaccntc gntggccntn ccccccccnnn tcctttnccc
820

          <210> 27
          <211> 818
          <212> DNA
          <213> Homo sapien

          <220>
          <221> misc_feature
          <222> (1)...(818)
          <223> n = A,T,C or G

          <400> 27
tctgggtgat ggcctcttcc tcctcaggga cctctgactg ctctgggcca aagaatctct   60
tgtttcttct ccgagcccca ggcagcggtg attcagccct gcccaacctg attctgatga   120
ctgcggatgc tgtgacggac ccaaggggca aatagggtcc cagggtccag ggaggggcgc   180
ctgctgagca cttccgcccc tcaccctgcc cagcccctgc catgagctct gggctgggtc   240
tccgcctcca gggttctgct cttccangca ngccancaag tggcgctggg ccacactggc   300
ttcttcctgc cccntccctg gctctgantc tctgtcttcc tgtcctgtgc angcnccttg   360
gatctcagtt tccctcnctc anngaactct gtttctgann tcttcantta actntgantt   420
tatnaccnan tggnctgtnc tgtcnnactt taatgggccn gaccggctaa tccctccctc   480
nctcccttcc anttcnnnna accngcttnc cntcntctcc ccntancccg ccnggaaanc   540
ctcctttgcc ctnaccangg gccnnnaccg cccntnnctn ggggggcnng gtnnctncnc   600
ctgntnnccc cnctcncnnt tncctcgtcc cnncnncgcn nngcannttc ncngtcccnn   660
tnnctcttcn ngtntcgnaa ngntcncntn tnnnnngncn ngntnnttncn tccctctcnc   720
cnnntgnang tnnttnnnnc ncngnncccc nnnncnnnnn nggnnntnnn tctncncngc   780
cccnncccccc ngnattaagg cctccnntct ccggccnc   818

          <210> 28
          <211> 731
          <212> DNA
          <213> Homo sapien

          <220>
          <221> misc_feature
          <222> (1)...(731)
          <223> n = A,T,C or G

          <400> 28
aggaagggcg gagggatatt gtangggatt gagggatagg agnataangg gggaggtgtg   60
tcccaacatg anggtgnngt tctcttttga angagggttg ngttttttann ccnggtgggt   120
gattnaaccc cattgtatgg agnnaaaggn tttnagggat ttttcggctc ttatcagtat   180
ntanattcct gtnaatcgga aaatnatntt tcnncnggaa aatnttgctc ccatccgnaa   240
attnctcccg ggtagtgcat nttnggggggn cngccangtt tcccaggctg ctanaatcgt   300
actaaagntt naagtgggan tncaaatgaa aacctnncac agagnatccn tacccgactg   360
tnnnttncct tcgccctntg actctgcnng agcccaatac ccnngngnat gtcnccngn   420
nnngcgncnc tgaaannnnc tcgnggctnn gancatcang gggtttcgca tcaaaagcnn   480
cgtttcncat naaggcactt tngcctcatc caaccnctng ccctcnncca tttngccgtc   540
nggttcncct acgctnnntg cncctnnntn ganatttttnc ccgcctnggg naancctcct   600
gnaatgggta gggncttntc ttttnaccnn gnggtntact aatcnnctnc acgcntnctt   660
tctcnacccc ccccttttt caatcccanc ggcnaatggg gtctccccnn cganggggggg   720
nnncccanne c   731

          <210> 29
          <211> 822
          <212> DNA
          <213> Homo sapien

          <220>

13

```
<221> misc_feature
<222> (1)...(822)
<223> n = A,T,C or G

    <400> 29
actagtccag tgtggtggaa ttccattgtg ttggggncnc ttctatgant antnttagat      60
cgctcanacc tcacanccNc ccnacnangc ctataangaa nannaataga nctgtncnnt     120
atntntacnc tcatanncct cnnnacccac tccctcttaa cccntactgt gcctatngcn     180
tnnctantct ntgccgcctn cnanccaccn gtgggccnac cncnngnatt ctcnatctcc     240
tcnccatntn gcctananta ngtncatacc ctatacctac nccaatgcta nnnctaancn     300
tccatnantt annntaacta ccactgacnt ngactttcnc atnanctcct aatttgaatc     360
tactctgact cccacngcct annnattagc ancntccccc nacnatntct caaccaaatc     420
ntcaacaacc tatctanctg ttcnccaacc nttncctccg atcccnnac aaccccctc      480
ccaaataccc nccacctgac ncctaacccn caccatcccg gcaagccnan ggncatttan     540
ccactggaat cacnatngga naaaaaaaac ccnaactctc tancncnnat ctccctaana     600
aatnctcctn naatttactn ncantnccat caancccacn tgaaacnnaa cccctgtttt     660
tanatccctt ctttcgaaaa ccnacccttt annncccaac ctttngggcc cccccnctnc     720
ccnaatgaag gncncccaat cnangaaacg nccntgaaaa ancnaggcna anannntccg     780
canatcctat cccttanttn ggggnccctt ncccngggcc cc                       822

    <210> 30
    <211> 787
    <212> DNA
    <213> Homo sapien

    <220>
    <221> misc_feature
    <222> (1)...(787)
    <223> n = A,T,C or G

    <400> 30
cggccgcctg ctctggcaca tgcctcctga atggcatcaa aagtgatgga ctgcccattg      60
ctagagaaga ccttctctcc tactgtcatt atggagccct gcagactgag ggctcccctt     120
gtctgcagga tttgatgtct gaagtcgtgg agtgtggcct ggagctcctc atctacatna     180
gctggaagcc ctggagggcc tctctcgcca gcctcccccT tctctccacg ctctccangg     240
acaccagggg ctccaggcag cccattattc ccagnangac atggtgtttc tccacgcgga     300
cccatggggc ctgnaaggcc agggtctcct ttgacaccat ctctcccgtc ctgcctggca     360
ggccgtggga tccactantt ctanaacggn cgccaccncg gtgggagctc cagcttttgt     420
tcccnttaat gaaggttaat tgcncgcttg gcgtaatcat nggtcanaac tntttcctgt     480
gtgaaattgt ttntcccctc ncnattccnc ncnacatacn aacccggaan cataaagtgt     540
taaagcctgg gggtngcctn nngaatnaac tnaactcaat taattgcgtt ggctcatggc     600
ccgctttccn ttcnggaaaa ctgtcntccc ctgcnttnnt gaatcggcca cccccccnggg     660
aaaagcggtt tgcnttttng ggggntcctt ccncttcccc cctcnctaan ccctncgcct     720
cggtcgttnc nggtngcggg gaangggnat nnnctcccnc naagggggng agnnngntat     780
ccccaaa                                                               787

    <210> 31
    <211> 799
    <212> DNA
    <213> Homo sapien

    <220>
    <221> misc_feature
    <222> (1)...(799)
    <223> n = A,T,C or G

    <400> 31
tttttttttt tttttttggc gatgctactg tttaattgca ggaggtgggg gtgtgtgtac      60
catgtaccag ggctattaga agcaagaagg aaggagggag ggcagagcgc cctgctgagc     120
aacaaaggac tcctgcagcc ttctctgtct gtctcttggc gcaggcacat ggggaggcct     180
cccgcagggt gggggccacc agtccagggg tgggagcact acanggggtg ggagtgggtg     240
gtggctggtn cnaatggcct gncacanatc cctacgattc ttgacacctg gatttcacca     300
```

```
ggggaccttc tgttctccca nggnaacttc ntnnatctcn aaagaacaca actgtttctt        360
cngcanttct ggctgttcat ggaaagcaca ggtgtccnat ttnggctggg acttggtaca        420
tatggttccg gcccacctct cccntcnaan aagtaattca cccccccccn ccntctnttg        480
cctgggccct taantaccca caccggaact canttantta ttcatcttng gntgggcttg        540
ntnatcnccn cctgaangcg ccaagttgaa aggccacgcc gtncccnctc cccatagnan        600
nttttnncnt canctaatgc cccccnggc aacnatccaa tccccccccn tgggggcccc         660
agcccanggc ccccgnctcg ggnnccngn cncgnantcc ccaggntctc ccantcngnc         720
ccnnngcncc cccgcacgca gaacanaagg ntngagccnc cgcannnnnn nggtnncnac        780
ctcgccccc ccnncgnng                                                     799
```

        <210> 32
        <211> 789
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(789)
        <223> n = A,T,C or G

        <400> 32
```
tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt        60
ttttnccnag ggcaggttta ttgacaacct cncgggacac aancaggctg gggacaggac        120
ggcaacaggc tccggcggcg gcggcggcgg ccctacctgc ggtaccaaat ntgcagcctc        180
cgctcccgct tgatnttcct ctgcagctgc aggatgccnt aaaacagggc ctcggccntn        240
ggtgggcacc ctgggatttn aatttccacg ggcacaatgc ggtcgcancc cctcaccacc        300
nattaggaat agtggtntta cccnccnccg ttggcncact cccntggaa accacttntc         360
gcggctccgg catctggtct taaaccttgc aaacnctggg gccctctttt tggttantnt        420
nccgccaca atcatnactc agactggcnc gggctggccc caaaaaancn ccccaaaacc         480
ggnccatgtc ttnncggggt tgctgcnatn tncatcacct cccgggcnca ncaggncaac        540
ccaaaagttc ttgnggcccn caaaaaanct ccggggggnc ccagtttcaa caaagtcatc        600
cccccttggcc cccaaatcct ccccccgntt nctgggtttg ggaacccacg cctctnnctt       660
tggnnggcaa gntggntccc ccttcgggcc cccggtgggc ccnnctctaa ngaaaacncc        720
ntcctnnnca ccatcccccc nngnnacgnc tancaangna tcccttttt tanaaacggg         780
cccccncg                                                                789
```

        <210> 33
        <211> 793
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(793)
        <223> n = A,T,C or G

        <400> 33
```
gacagaacat gttggatggt ggagcacctt tctatacgac ttacaggaca gcagatgggg        60
aattcatggc tgttggagca atanaaccc agttctacga gctgctgatc aaaggacttg         120
gactaaagtc tgatgaactt cccaatcaga tgagcatgga tgattggcca gaaatgaana        180
agaagtttgc agatgtattt gcaaagaaga cgaaggcaga gtggtgtcaa atctttgacg        240
gcacagatgc ctgtgtgact ccggttctga cttttgagga ggttgttcat catgatcaca        300
acaangaacg gggctcgttt atcaccantg aggagcagga cgtgagcccc cgccctgcac       360
ctctgctgtt aaacacccca gccatcccct ctttcaaaag ggatccacta cttctagagc        420
ggncgccacc gcggtggagc tccagctttt gttcccttta gtgagggtta attgcgcgct        480
tggcgtaatc atggtcatan ctgtttcctg tgtgaaattg ttatccgctc acaattccac        540
acaacatacg anccggaagc atnaaatttt aaagcctggn ggtngcctaa tgantgaact        600
nactcacatt aattggcttt gcgctcactg cccgctttcc agtccggaaa acctgtcctt        660
gccagctgcc nttaatgaat cnggccaccc cccgggggaaa aggcngtttg cttnttgggg      720
cgcncttccc gctttctcgc ttcctgaant ccttcccccc ggtctttcgg cttgcggcna        780
acggtatcna cct                                                         793
```

15

```
<210> 34
<211> 756
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(756)
<223> n = A,T,C or G

<400> 34
gccgcgaccg gcatgtacga gcaactcaag ggcgagtgga accgtaaaag ccccaatctt      60
ancaagtgcg gggaanagct gggtcgactc aagctagttc ttctggagct caacttcttg     120
ccaaccacag ggaccaagct gaccaaacag cagctaattc tggcccgtga catactggag     180
atcggggccc aatggagcat cctacgcaan gacatcccct ccttcgagcg ctacatggcc     240
cagctcaaat gctactactt tgattacaan gagcagctcc ccgagtcagc ctatatgcac     300
cagctcttgg gcctcaacct cctcttcctg ctgtcccaga accgggtggc tgantnccac     360
acgganttgg ancggctgcc tgcccaanga catacanacc aatgtctaca tcnaccacca     420
gtgtcctgga gcaatactga tgganggcag ctaccncaaa gtnttcctgg ccnagggtaa     480
catccccgc cgagagctac accttcttca ttgacatcct gctcgacact atcagggatg      540
aaaatcgcng ggttgctcca gaaaggctnc aanaanatcc ttttcnctga aggcccccgg     600
atncnctagt nctagaatcg gcccgccatc gcggtgganc ctccaacctt tcgttnccct     660
ttactgaggg ttnattgccg cccttggcgt tatcatggtc acnccngttn cctgtgttga     720
aattnttaac cccccacaat tccacgccna cattng                               756
```

```
<210> 35
<211> 834
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(834)
<223> n = A,T,C or G

<400> 35
ggggatctct anatcnacct gnatgcatgg ttgtcggtgt ggtcgctgtc gatgaanatg      60
aacaggatct tgcccttgaa gctctcggct gctgtnttta agttgctcag tctgccgtca     120
tagtcagaca cnctcttggg caaaaaacan caggatntga gtcttgattt cacctccaat     180
aatcttcngg gctgtctgct cggtgaactc gatgacnang ggcagctggt tgtgtntgat     240
aaantccanc angttctcct tggtgacctc cccttcaaag ttgttccggc cttcatcaaa     300
cttctnnaan angannancc canctttgtc gagctggnat ttgganaaca cgtcactgtt     360
ggaaactgat cccaaatggt atgtcatcca tcgcctctgc tgcctgcaaa aaacttgctt     420
ggcncaaatc cgactcccccn tccttgaaag aagccnatca cacccccctc cctggactcc     480
nncaangact ctnccgctnc cccntccnng cagggttggt ggcannccgg gcccntgcgc     540
ttcttcagcc agttcacnat nttcatcagc ccctctgcca gctgttntat tccttggggg     600
ggaanccgtc tctcccttcc tgaannaact ttgaccgtng gaatagccgc gcntcnccnt     660
acntnctggg ccgggttcaa antccctccn ttgncnntcn cctcgggcca ttctggattt     720
nccnaacttt ttccttcccc cnccccncgg ngtttggntt tttcatnggg ccccaactct     780
gctnttggcc antcccctgg gggcntntan cnccccctnt ggtcccntng ggcc           834
```

```
<210> 36
<211> 814
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(814)
<223> n = A,T,C or G

<400> 36
```

```
cggncgcttt ccngccgcgc cccgtttcca tgacnaaggc tcccttcang ttaaatacnn        60
cctagnaaac attaatgggt tgctctacta atacatcata cnaaccagta agcctgccca       120
naacgccaac tcaggccatt cctaccaaag gaagaaaggc tggtctctcc acccctgta        180
ggaaaggcct gccttgtaag acaccacaat ncggctgaat ctnaagtctt gtgttttact       240
aatggaaaaa aaaaataaac aanaggtttt gttctcatgg ctgcccaccg cagcctggca       300
ctaaaacanc ccagcgctca cttctgcttg ganaaatatt ctttgctctt ttggacatca       360
ggcttgatgg tatcactgcc acntttccac ccagctgggc nccctteccc catntttgtc       420
antganctgg aaggcctgaa ncttagtctc caaaagtctc ngcccacaag accggccacc       480
aggggangtc ntttncagtg gatctgccaa anantacccn tatcatcnnt gaataaaaag       540
gcccctgaac ganatgcttc cancancctt taagacccat aatcctngaa ccatggtgcc       600
cttccggtct gatccnaaag gaatgttcct gggtcccant ccctcctttg ttncttacgt       660
tgtnttggac ccntgctngn atnacccaan tganatcccc ngaagcaccc tnccctggc        720
atttganttt cntaaattct ctgccctacn nctgaaagca cnattccctn ggcnccnaan       780
ggngaactca agaaggtctn ngaaaaacca cncn                                    814
```

        <210> 37
        <211> 760
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(760)
        <223> n = A,T,C or G

        <400> 37

```
gcatgctgct cttcctcaaa gttgttcttg ttgccataac aaccaccata ggtaaagcgg        60
gcgcagtgtt cgctgaaggg gttgtagtac cagcgcggga tgctctcctt gcagagtcct       120
gtgtctggca ggtccacgca atgccctttg tcactgggga aatggatgcg ctggagctcg       180
tcnaanccac tcgtgtattt ttcacangca gcctcctccg aagcntccg. gcagttgggg       240
gtgtcgtcac actccactaa actgtcgatn cancagccca ttgctgcagc ggaactgggt       300
gggctgacag gtgccagaac acactggatn ggcctttcca tggaagggcc tgggggaaat       360
cncctnancc caaactgcct ctcaaaggcc accttgcaca ccccgacagg ctagaaatgc       420
actcttcttc ccaaaggtag ttgttcttgt tgcccaagca ncctccanca aaccaaaanc       480
ttgcaaaatc tgctccgtgg gggtcatnnn taccanggtt ggggaaanaa acccggcngn       540
ganccncctt gtttgaatgc naaggnaata atcctcctgt cttgcttggg tggaanagca       600
caattgaact gttaacnttg ggccgngttc cnctngggtg gtctgaaact aatcaccgtc       660
actgaaaaa ggtangtgcc ttccttgaat tcccaaantt cccctngntt tgggtnnttt       720
ctcctctncc ctaaaaatcg tnttcccccc ccntanggcg                            760
```

        <210> 38
        <211> 724
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(724)
        <223> n = A,T,C or G

        <400> 38

```
tttttttttt tttttttttt tttttttttt ttttaaaaa cccccctccat tgaatgaaaa        60
cttccnaaat tgtccaaccc cctcnnccaa atnnccattt ccggggggggg gttccaaacc      120
caaattaatt ttgganttta aattaaatnt tnattngggg aanaanccaa atgtnaagaa       180
aatttaaccc attatnaact taaatncctn gaaacccntg gnttccaaaa atttttaacc      240
cttaaatccc tccgaaattg ntaanggaaa accaaattcn cctaaggctn tttgaaggtt       300
ngatttaaac cccccttnant tnttttnacc cnngnctnaa ntatttngnt tccggtgttt     360
tcctnttaan cntnggtaac tcccgntaat gaannnccct aanccaatta aaccgaattt      420
tttttgaatt ggaaattccn ngggaattna ccggggtttt tcccntttgg gggccatncc      480
cccnctttcg gggtttgggn ntaggttgaa ttttttnnang ncccaaaaaa nccccccaana    540
aaaaaactcc caagnnttaa ttngaatntc ccccttccca ggccttttgg gaaaggnggg      600
tttntggggg ccngggantt cnttcccccn ttnccncccc cccccnggt aaanggttat      660
```

17

```
ngnntttggt ttttgggccc cttnanggac cttccggatn gaaattaaat ccccgggncg    720
gccg                                                                724
```

```
        <210> 39
        <211> 751
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(751)
        <223> n = A,T,C or G

        <400> 39
tttttttttt tttttctttg ctcacattta atttttattt tgattttttt taatgctgca    60
caacacaata tttatttcat ttgtttcttt tatttcattt tatttgtttg ctgctgctgt   120
tttatttatt tttactgaaa gtgagaggga acttttgtgg cctttttttcc tttttctgta   180
ggccgcctta agctttctaa atttggaaca tctaagcaag ctgaanggaa aaggggggttt    240
cgcaaaatca ctcggggaa nggaaaggtt gctttgttaa tcatgcccta tggtgggtga    300
ttaactgctt gtacaattac ntttcacttt taattaattg tgctnaangc tttaattana    360
cttggggggtt ccctccccan accaacccct .ctgacaaaaa gtgccngccc tcaaatnatg    420
tcccggccnnt cnttgaaaca cacngcngaa ngttctcatt ntcccncnc caggtnaaaa    480
tgaagggtta ccatntttaa cnccacctcc acntggcnnn gcctgaatcc tcnaaaancn    540
ccctcaancn aattnctnng ccccggtcnc gcntnngtcc cnccccgggct ccgggaantn    600
cacccccnga anncnntnnc naacnaaatt ccgaaaatat tcccnntcnc tcaattcccc    660
cnnagactnt cctcnncnan cncaatttttc ttttnntcac gaacncgnnc cnnaaaatgn    720
nnnncncctc cnctngtccn naatcnccan c                                  751
```

```
        <210> 40
        <211> 753
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(753)
        <223> n = A,T,C or G

        <400> 40
gtggtatttt ctgtaagatc aggtgttcct ccctcgtagg tttagaggaa acaccctcat    60
agatgaaaac cccccgaga cagcagcact gcaactgcca agcagccggg gtaggagggg    120
cgccctatgc acagctgggc ccttgagaca gcagggcttc gatgtcaggc tcgatgtcaa    180
tggtctggaa gcggcggctg tacctgcgta ggggcacacc gtcagggccc accaggaact    240
tctcaaagtt ccaggcaacn tcgttgcgac acaccggaga ccaggtgatn agcttggggt    300
cggtcataan cgcggtggcg tcgtcgctgg gagctggcag ggcctcccgc aggaaggcna    360
ataaaaggtg cgcccccgca ccgttcanct cgcacttctc naanaccatg angttgggct    420
cnaacccacc accannccgg acttccttga nggaattccc aaatctcttc gntcttgggc    480
ttctnctgat gccctanctg gttgccncgn atgccaanca nccccaancc ccggggtcct    540
aaancacccn cctcctcntt tcatctgggt tnttntcccc ggaccntggt tcctctcaag    600
ggancccata tctcnaccan tactcaccnt nccccccccnt gnnacccanc cttctanngn    660
ttcccnccccg ncctctggcc cntcaaanan gcttncacna cctgggtctg ccttcccccc    720
tncccctatct gnaccccncn tttgtctcan tnt                               753
```

```
        <210> 41
        <211> 341
        <212> DNA
        <213> Homo sapien

        <400> 41
ʼactatatcca tcacaacaga catgcttcat cccatagact tcttgacata gcttcaaatg    60
agtgaaccca tccttgattt atatacatat atgttctcag tattttggga gcctttccac    120
ttctttaaac cttgttcatt atgaacactg aaaataggaa tttgtgaaga gttaaaaagt    180
```

18

```
tatagcttgt ttacgtagta agttttttgaa gtctacattc aatccagaca cttagttgag        240
tgttaaactg tgattttttaa aaaatatcat ttgagaatat tctttcagag gtattttcat        300
ttttacttttt tgattaattg tgtttttatat attagggtag t                          341
```

          <210> 42
          <211> 101
          <212> DNA
          <213> Homo sapien

          <400> 42
```
acttactgaa tttagttctg tgctcttcct tatttagtgt tgtatcataa atactttgat         60
gtttcaaaca ttctaaataa ataattttca gtggcttcat a                            101
```

          <210> 43
          <211> 305
          <212> DNA
          <213> Homo sapien

          <400> 43
```
acatctttgt tacagtctaa gatgtgttct taaatcacca ttccttcctg gtcctcaccc        60
tccagggtgg tctcacactg taattagagc tattgaggag tctttacagc aaattaagat        120
tcagatgcct tgctaagtct agagttctag agttatgttt cagaaagtct aagaaaccca        180
cctcttgaga ggtcagtaaa gaggacttaa tatttcatat ctacaaaatg accacaggat        240
tggatacaga acgagagtta tcctggataa ctcagagctg agtacctgcc cggggggccgc       300
tcgaa                                                                    305
```

          <210> 44
          <211> 852
          <212> DNA
          <213> Homo sapien

          <220>
          <221> misc_feature
          <222> (1)...(852)
          <223> n = A,T,C or G

          <400> 44
```
acataaatat cagagaaaag tagtctttga aatatttacg tccaggagtt ctttgtttct        60
gattatttgg tgtgtgtttt ggtttgtgtc caaagtattg gcagcttcag ttttcatttt        120
ctctccatcc tcgggcattc ttcccaaatt tatataccag tcttcgtcca tccacacgct        180
ccagaatttc tcttttgtag taatatctca tagctcggct gagcttttca taggtcatgc        240
tgctgttgtt cttctttttta ccccatagct gagccactgc ctctgatttc aagaacctga       300
agacgccctc agatcggtct tcccatttta ttaatcctgg gttcttgtct gggttcaaga        360
ggatgtcgcg gatgaattcc cataagtgag tccctctcgg gttgtgcttt ttggtgtggc        420
acttggcagg ggggtcttgc tcctttttca tatcaggtga ctctgcaaca ggaaggtgac        480
tggtggttgt catggagatc tgagcccggc agaaagtttt gctgtccaac aaatctactg        540
tgctaccata gttggtgtca tataaatagt tctngtcttt ccaggtgttc atgatggaag        600
gctcagtttg ttcagtcttg acaatgacat tgtgtgtgga ctggaacagg tcactactgc        660
actggccgtt ccacttcaga tgctgcaagt tgctgtagag gagntgcccc gccgtccctg        720
ccgcccgggt gaactcctgc aaactcatgc tgcaaaggtg ctcgccgttg atgtcgaact        780
cntggaaagg gatacaattg gcatccagct ggttggtgtc caggaggtga tggagccact        840
cccacacctg gt                                                            852
```

          <210> 45
          <211> 234
          <212> DNA
          <213> Homo sapien

          <400> 45
```
acaacagacc cttgctcgct aacgacctca tgctcatcaa gttggacgaa tccgtgtccg        60
agtctgacac catccggagc atcagcattg cttcgcagtg ccctaccgcg gggaactctt        120
gcctcgtttc tggctggggt ctgctggcga acggcagaat gcctaccgtg ctgcagtgcg        180
```

19

```
tgaacgtgtc ggtggtgtct gaggaggtct gcagtaagct ctatgacccg ctgt          234
```

```
        <210> 46
        <211> 590
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(590)
        <223> n = A,T,C or G

        <400> 46
acttttattt taaatgttta taaggcagat ctatgagaat gatagaaaac atggtgtgta          60
atttgatagc aatattttgg agattacaga gttttagtaa ttaccaatta cacagttaaa         120
aagaagataa tatattccaa gcanatacaa aatatctaat gaaagatcaa ggcaggaaaa         180
tgantataac taattgacaa tggaaaatca attttaatgt gaattgcaca ttatcctta          240
aaagctttca aaanaaanaa ttattgcagt ctanttaatt caaacagtgt taaatggtat         300
caggataaan aactgaaggg canaaagaat taattttcac ttcatgtaac ncacccanat         360
ttacaatggc ttaaatgcan ggaaaaagca gtggaagtag ggaagtantc aaggtctttc         420
tggtctctaa tctgccttac tctttgggtg tggctttgat cctctggaga cagctgccag         480
ggctcctgtt atatccacaa tcccagcagc aagatgaagg gatgaaaaag gacacatgct         540
gccttccttt gaggagactt catctcactg gccaacactc agtcacatgt                    590
```

```
        <210> 47
        <211> 774
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(774)
        <223> n = A,T,C or G

        <400> 47
acaagggggc ataatgaagg agtggggana gattttaaag aaggaaaaaa aacgaggccc          60
tgaacagaat tttcctgnac aacggggctt caaaataatt ttcttggggga ggttcaagac         120
gcttcactgc ttgaaactta aatggatgtg ggacanaatt ttctgtaatg accctgaggg         180
cattacagac gggactctgg gaggaaggat aaacagaaag gggacaaagg ctaatcccaa         240
aacatcaaag aaaggaaggt ggcgtcatac ctcccagcct acacagttct ccagggctct         300
cctcatccct ggaggacgac agtggaggaa caactgacca tgtccccagg ctcctgtgtg         360
ctggctcctg gtcttcagcc cccagctctg gaagcccacc ctctgctgat cctgcgtggc         420
ccacactcct tgaacacaca tccccaggtt atattcctgg acatggctga acctcctatt         480
cctacttccg agatgccttg ctccctgcag cctgtcaaaa tcccactcac cctccaaacc         540
acggcatggg aagcctttct gacttgcctg attactccag catcttggaa caatccctga         600
ttccccactc cttagaggca agatagggtg gttaagagta gggctggacc acttggagcc         660
aggctgctgg cttcaaattn tggctcattt acgagctatg ggaccttggg caagtnatct         720
tcacttctat gggcntcatt ttgttctacc tgcaaaatgg gggataataa tagt               774
```

```
        <210> 48
        <211> 124
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(124)
        <223> n = A,T,C or G

        <400> 48
canaaattga aattttataa aaaggcattt ttctcttata tccataaaat gatataattt          60
ttgcaantat anaaatgtgt cataaattat aatgttcctt aattacagct caacgcaact         120
```

20

```
        tggt                                                      124

            <210> 49
            <211> 147
            <212> DNA
            <213> Homo sapien

            <220>
            <221> misc_feature
            <222> (1)...(147)
            <223> n = A,T,C or G

            <400> 49
        gccgatgcta ctattttatt gcaggaggtg ggggtgtttt tattattctc tcaacagctt     60
        tgtggctaca ggtggtgtct gactgcatna aaaanttttt tacgggtgat tgcaaaaatt    120
        ttagggcacc catatcccaa gcantgt                                       147

            <210> 50
            <211> 107
            <212> DNA
            <213> Homo sapien

            <400> 50
        acattaaatt aataaaagga ctgttggggt tctgctaaaa cacatggctt gatatattgc     60
        atggtttgag gttaggagga gttaggcata tgttttggga gaggggt                  107

            <210> 51
            <211> 204
            <212> DNA
            <213> Homo sapien

            <400> 51
        gtcctaggaa gtctagggga cacacgactc tggggtcacg gggccgacac acttgcacgg     60
        cgggaaggaa aggcagagaa gtgacaccgt caggggaaa tgacagaaag gaaaatcaag     120
        gccttgcaag gtcagaaagg ggactcaggg cttccaccac agccctgccc cacttggcca    180
        cctccctttt gggaccagca atgt                                          204

            <210> 52
            <211> 491
            <212> DNA
            <213> Homo sapien

            <220>
            <221> misc_feature
            <222> (1)...(491)
            <223> n = A,T,C or G

            <400> 52
        acaaagataa catttatctt ataacaaaaa tttgatagtt ttaaaggtta gtattgtgta     60
        gggtattttc caaaagacta aagagataac tcaggtaaaa agttagaaat gtataaaaca    120
        ccatcagaca ggtttttaaa aaacaacata ttacaaaatt agacaatcat ccttaaaaaa    180
        aaaacttctt gtatcaattt cttttgttca aaatgactga cttaantatt tttaaatatt    240
        tcanaaacac ttcctcaaaa attttcaana tggtagcttt canatgtncc ctcagtccca    300
        atgttgctca gataaataaa tctcgtgaga acttaccacc caccacaagc tttctggggc    360
        atgcaacagt gtcttttctt tncttttttct ttttttttt ttacaggcac agaaactcat    420
        caattttatt tggataacaa aggtctcca aattatattg aaaaataaat ccaagttaat    480
        atcactcttg t                                                        491

            <210> 53
            <211> 484
            <212> DNA
            <213> Homo sapien
```

```
<220>
<221> misc_feature
<222> (1)...(484)
<223> n = A,T,C or G

<400> 53
acataattta gcagggctaa ttaccataag atgctattta ttaanaggtn tatgatctga    60
gtattaacag ttgctgaagt ttggtatttt tatgcagcat tttctttttg ctttgataac   120
actacagaac ccttaaggac actgaaaatt agtaagtaaa gttcagaaac attagctgct   180
caatcaaatc tctacataac actatagtaa ttaaaacgtt aaaaaaaagt gttgaaatct   240
gcactagtat anaccgctcc tgtcaggata anactgcttt ggaacagaaa gggaaaaanc   300
agctttgant ttctttgtgc tgatangagg aaaggctgaa ttaccttgtt gcctctccct   360
aatgattggc aggtcnggta aatnccaaaa catattccaa ctcaacactt cttttccncg   420
tancttgant ctgtgtattc caggancagg cggatggaat gggccagccc ncggatgttc   480
cant                                                                484

<210> 54
<211> 151
<212> DNA
<213> Homo sapien

<400> 54
actaaacctc gtgcttgtga actccataca gaaaacggtg ccatccctga acacggctgg    60
ccactgggta tactgctgac aaccgcaaca acaaaaacac aaatccttgg cactggctag   120
tctatgtcct ctcaagtgcc tttttgtttg t                                 151

<210> 55
<211> 91
<212> DNA
<213> Homo sapien

<400> 55
acctggcttg tctccgggtg gttcccggcg ccccccacgg tccccagaac ggacactttc    60
gccctccagt ggatactcga gccaaagtgg t                                  91

<210> 56
<211> 133
<212> DNA
<213> Homo sapien

<400> 56
ggcggatgtg cgttggttat atacaaatat gtcattttat gtaagggact tgagtatact    60
tggatttttg gtatctgtgg gttggggggga cggtccagga accaataccc catggatacc   120
aagggacaac tgt                                                      133

<210> 57
<211> 147
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(147)
<223> n = A,T,C or G

<400> 57
actctggaga acctgagccg ctgctccgcc tctgggatga ggtgatgcan gcngtggcgc    60
gactgggagc tgagcccttc cctttgcgcc tgcctcagag gattgttgcc gacntgcana   120
tctcantggg ctggatncat gcagggt                                      147

<210> 58
```

22

```
<211> 198
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(198)
<223> n = A,T,C or G

<400> 58
acagggatat aggtttnaag ttattgtnat tgtaaaatac attgaatttt ctgtatactc      60
tgattacata catttatcct ttaaaaaaga tgtaaatctt aatttttatg ccatctatta     120
atttaccaat gagttacctt gtaaatgaga agtcatgata gcactgaatt ttaactagtt     180
ttgacttcta agtttggt                                                    198

<210> 59
<211> 330
<212> DNA
<213> Homo sapien

<400> 59
acaacaaatg ggttgtgagg aagtcttatc agcaaaactg gtgatggcta ctgaaaagat      60
ccattgaaaa ttatcattaa tgattttaaa tgacaagtta tcaaaaactc actcaatttt     120
cacctgtgct agcttgctaa aatgggagtt aactctagag caaatatagt atcttctgaa     180
tacagtcaat aaatgacaaa gccagggcct acaggtggtt tccagacttt ccagacccag     240
cagaaggaat ctattttatc acatggatct ccgtctgtgc tcaaaatacc taatgatatt     300
tttcgtcttt attggacttc tttgaagagt                                       330

<210> 60
<211> 175
<212> DNA
<213> Homo sapien

<400> 60
accgtgggtg ccttctacat tcctgacggc tccttcacca acatctggtt ctacttcggc      60
gtcgtgggct ccttcctctt catcctcatc cagctggtgc tgctcatcga ctttgcgcac     120
tcctggaacc agcggtggct gggcaaggcc gaggagtgcg attcccgtgc ctggt          175

<210> 61
<211> 154
<212> DNA
<213> Homo sapien

<400> 61
accccacttt tcctcctgtg agcagtctgg acttctcact gctacatgat gagggtgagt      60
ggttgttgct cttcaacagt atcctcccct ttccggatct gctgagccgg acagcagtgc     120
tggactgcac agccccgggg ctccacattg ctgt                                  154

<210> 62
<211> 30
<212> DNA
<213> Homo sapien

<400> 62
cgctcgagcc ctatagtgag tcgtattaga                                        30

<210> 63
<211> 89
<212> DNA
<213> Homo sapien

<400> 63
```

23

```
acaagtcatt tcagcaccct ttgctcttca aaactgacca tcttttatat ttaatgcttc      60
ctgtatgaat aaaaatggtt atgtcaagt                                        89
```

        <210> 64
        <211> 97
        <212> DNA
        <213> Homo sapien

        <400> 64
```
accggagtaa ctgagtcggg acgctgaatc tgaatccacc aataaataaa ggttctgcag      60
aatcagtgca tccaggattg gtccttggat ctggggt                               97
```

        <210> 65
        <211> 377
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(377)
        <223> n = A,T,C or G

        <400> 65
```
acaacaanaa ntcccttctt taggccactg atggaaacct ggaaccccct tttgatggca      60
gcatggcgtc ctaggccttg acacagcggc tggggtttgg gctntcccaa accgcacacc     120
ccaaccctgg tctacccaca nttctggcta tgggctgtct ctgccactga acatcagggt     180
tcggtcataa natgaaatcc caanggggac agaggtcagt agaggaagct caatgagaaa     240
ggtgctgttt gctcagccag aaaacagctg cctggcattc gccgctgaac tatgaacccg     300
tggggggtgaa ctaccccan gaggaatcat gcctgggcga tgcaanggtg ccaacaggag     360
gggcgggagg agcatgt                                                    377
```

        <210> 66
        <211> 305
        <212> DNA
        <213> Homo sapien

        <400> 66
```
acgcctttcc ctcagaattc agggaagaga ctgtcgcctg ccttcctccg ttgttgcgtg      60
agaacccgtg tgccccttcc caccatatcc accctcgctc catctttgaa ctcaaacacg     120
aggaactaac tgcaccctgg tcctctcccc agtccccagt tcaccctcca tccctcacct     180
tcctccactc taagggatat caacactgcc cagcacaggg gccctgaatt tatgtggttt     240
ttatatattt tttaataaga tgcactttat gtcatttttt aataaagtct gaagaattac     300
tgttt                                                                 305
```

        <210> 67
        <211> 385
        <212> DNA
        <213> Homo sapien

        <400> 67
```
actacacaca ctccacttgc ccttgtgaga cactttgtcc cagcacttta ggaatgctga      60
ggtcggacca gccacatctc atgtgcaaga ttgcccagca gacatcaggt ctgagagttc     120
cccttttaaa aaaggggact tgcttaaaaa agaagtctag ccacgattgt gtagagcagc     180
tgtgctgtgc tggagattca cttttgagag agttctcctc tgagacctga tctttagagg     240
ctgggcagtc ttgcacatga gatggggctg gtctgatctc agcactcctt agtctgcttg     300
cctctcccag ggccccagcc tggccacacc tgcttacagg gcactctcag atgcccatac     360
catagtttct gtgctagtgg accgt                                           385
```

        <210> 68
        <211> 73
        <212> DNA
        <213> Homo sapien

24

```
        <400> 68
acttaaccag atatattttt accccagatg gggatattct ttgtaaaaaa tgaaaataaa        60
gtttttttaa tgg                                                           73

        <210> 69
        <211> 536
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(536)
        <223> n = A,T,C or G

        <400> 69
actagtccag tgtggtggaa ttccattgtg ttggggctc tcaccctcct ctcctgcagc         60
tccagctttg tgctctgcct ctgaggagac catggcccag catctgagta ccctgctgct        120
cctgctggcc accctagctg tggccctggc ctggagcccc aaggaggagg ataggataat        180
cccgggtggc atctataacg cagacctcaa tgatgagtgg gtacagcgtg cccttcactt        240
cgccatcagc gagtataaca aggccaccaa agatgactac tacagacgtc cgctgcgggt        300
actaagagcc aggcaacaga ccgttggggg ggtgaattac ttcttcgacg tagaggtggg        360
ccgaaccata tgtaccaagt cccagcccaa cttggacacc tgtgccttcc atgaacagcc        420
agaactgcag aagaaacagt tgtgctcttt cgagatctac gaagttccct ggggagaaca        480
gaangtccct gggtgaaatc caggtgtcaa gaaatcctan ggatctgttg ccaggc           536

        <210> 70
        <211> 477
        <212> DNA
        <213> Homo sapien
        <400> 70
atgacccta acaggggccc tctcagccct cctaatgacc tccggcctag ccatgtgatt         60
tcacttccac tccataacgc tcctcatact aggcctacta accaacacac taaccatata        120
ccaatgatgg cgcgatgtaa cacgagaaag cacataccaa ggccaccaca caccacctgt        180
ccaaaaaggc cttcgatacg ggataatcct atttattacc tcagaagttt ttttcttcgc        240
agggattttt ctgagccttt taccactcca gcctagcccc tacccccaa ctaggagggc         300
actggcccc aacaggcatc accccgctaa atccctaga agtcccactc ctaaacacat          360
ccgtattact cgcatcagga gtatcaatca cctgagctca ccatagtcta atagaaaaca        420
accgaaacca aattattcaa agcactgctt attacaattt tactgggtct ctatttt          477

        <210> 71
        <211> 533
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(533)
        <223> n = A,T,C or G

        <400> 71
agagctatag gtacagtgtg atctcagctt tgcaaacaca ttttctacat agatagtact        60
aggtattaat agatatgtaa agaaagaaat cacaccatta ataatggtaa gattggttta       120
tgtgatttta gtggtatttt tggcacccct atatatgttt tccaaacttt cagcagtgat       180
attatttcca taacttaaaa agtgagtttg aaaaagaaaa tctccagcaa gcatctcatt       240
taaataaagg tttgtcatct ttaaaaatac agcaatatgt gactttttaa aaaagctgtc       300
aaataggtgt gaccctacta ataattatta gaaatacatt taaaaacatc gagtacctca       360
agtcagtttg ccttgaaaaa tatcaaatat aactcttaga gaaatgtaca taaaagaatg       420
cttcgtaatt ttggagtang aggttccctc ctcaattttg tattttttaaa aagtacatgg      480
taaaaaaaaa aattcacaac agtatataag gctgtaaaat gaagaattct gcc              533

        <210> 72
```

```
        <211> 511
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(511)
        <223> n = A,T,C or G

        <400> 72
tattacggaa aaacacacca cataattcaa ctancaaaga anactgcttc agggcgtgta       60
aaatgaaagg cttccaggca gttatctgat taaagaacac taaaagaggg acaaggctaa      120
aagccgcagg atgtctacac tatancaggc gctatttggg ttggctggag gagctgtgga      180
aaacatggan agattggtgc tgganatcgc cgtggctatt cctcattgtt attacanagt      240
gaggttctct gtgtgcccac tggtttgaaa accgttctnc aataatgata gaatagtaca      300
cacatgagaa ctgaaatggc ccaaacccag aaagaaagcc caactagatc ctcagaanac      360
gcttctaggg acaataaccg atgaagaaaa gatggcctcc ttgtgccccc gtctgttatg      420
atttctctcc attgcagcna naaacccgtt cttctaagca aacncaggtg atgatggcna      480
aaatacaccc cctcttgaag naccnggagg a                                     511


        <210> 73
        <211> 499
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(499)
        <223> n = A,T,C or G

        <400> 73
cagtgccagc actggtgcca gtaccagtac caataacagt gccagtgcca gtgccagcac       60
cagtggtggc ttcagtgctg gtgccagcct gaccgccact ctcacatttg ggctcttcgc      120
tggccttggt ggagctggtg ccagcaccag tggcagctct ggtgcctgtg gtttctccta      180
caagtgagat tttagatatt gttaatcctg ccagtctttc tcttcaagcc agggtgcatc      240
ctcagaaacc tactcaacac agcactctag gcagccacta tcaatcaatt gaagttgaca      300
ctctgcatta aatctatttg ccatttctga aaaaaaaaaa aaaaaaaggg cggccgctcg      360
antctagagg gcccgtttaa acccgctgat cagcctcgac tgtgccttct anttgccagc      420
catctgttgt ttgcccctcc cccgntgcct tccttgaccc tggaaagtgc cactcccact      480
gtcctttcct aantaaaat                                                   499


        <210> 74
        <211> 537
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(537)
        <223> n = A,T,C or G

        <400> 74
tttcatagga gaacacactg aggagatact tgaagaattt ggattcagcc gcgaagagat       60
ttatcagctt aactcagata aaatcattga aagtaataag gtaaaagcta gtctctaact      120
tccaggccca cggctcaagt gaatttgaat actgcattta cagtgtagag taacacataa      180
cattgtatgc atggaaacat ggaggaacag tattacagtg tcctaccact ctaatcaaga      240
aaagaattac agactctgat tctacagtga tgattgaatt ctaaaaatgg taatcattag      300
ggcttttgat ttataanact ttgggtactt atactaaatt atggtagtta tactgccttc      360
cagtttgctt gatatatttg ttgatattaa gattcttgac ttatattttg aatgggttct      420
actgaaaaan gaatgatata ttcttgaaga catcgatata catttattta cactcttgat      480
tctacaatgt agaaaatgaa ggaaatgccc caaattgtat ggtgataaaa gtcccgt         537
```

26

```
<210> 75
<211> 467
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(467)
<223> n = A,T,C or G

<400> 75
caaanacaat tgttcaaaag atgcaaatga tacactactg ctgcagctca caaacacctc        60
tgcatattac acgtacctcc tcctgctcct caagtagtgt ggtctatttt gccatcatca       120
cctgctgtct gcttagaaga acggctttct gctgcaangg agagaaatca taacagacgg       180
tggcacaagg aggccatctt ttcctcatcg gttattgtcc ctagaagcgt cttctgagga       240
tctagttggg ctttctttct gggtttgggc catttcantt ctcatgtgtg tactattcta       300
tcattattgt ataacggttt tcaaaccngt gggcacncag agaacctcac tctgtaataa       360
caatgaggaa tagccacggt gatctccagc accaaatctc tccatgttnt tccagagctc       420
ctccagccaa cccaaatagc cgctgctatn gtgtagaaca tccctgn                     467
```

```
<210> 76
<211> 400
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(400)
<223> n = A,T,C or G

<400> 76
aagctgacag cattcgggcc gagatgtctc gctccgtggc cttagctgtg ctcgcgctac        60
tctctctttc tggcctggag gctatccagc gtactccaaa gattcaggtt tactcacgtc       120
atccagcaga gaatggaaag tcaaatttcc tgaattgcta tgtgtctggg tttcatccat       180
ccgacattga agttgactta ctgaagaatg gagagagaat tgaaaaagtg gagcattcag       240
acttgtcttt cagcaaggac tggtctttct atctcttgta ctacactgaa ttcacccca        300
ctgaaaaaga tgagtatgcc tgccgtgtga accatgtgac tttgtcacag cccaagatng       360
ttnagtggga tcganacatg taagcagcan catgggaggt                              400
```

```
<210> 77
<211> 248
<212> DNA
<213> Homo sapien

<400> 77
ctggagtgcc ttggtgtttc aagcccctgc aggaagcaga atgcaccttc tgaggcacct        60
ccagctgccc cggcggggga tgcgaggctc ggagcaccct tgcccggctg tgattgctgc       120
caggcactgt tcatctcagc tttttctgtcc ctttgctccc ggcaagcgct tctgctgaaa      180
gttcatatct ggagcctgat gtcttaacga ataaaggtcc catgctccac ccgaaaaaaa       240
aaaaaaaa                                                                 248
```

```
<210> 78
<211> 201
<212> DNA
<213> Homo sapien

<400> 78
actagtccag tgtggtggaa ttccattgtg ttgggcccaa cacaatggct acctttaaca        60
tcacccagac cccgcccctgc ccgtgcccca cgctgctgct aacgacagta tgatgcttac       120
tctgctactc ggaaactatt tttatgtaat taatgtatgc tttcttgttt ataaatgcct       180
gatttaaaaa aaaaaaaaaa a                                                   201
```

27

```
<210> 79
<211> 552
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(552)
<223> n = A,T,C or G

<400> 79
tccttttgtt aggttttga gacaaccctr gacctaaact gtgtcacaga cttctgaatg      60
tttaggcagt gctagtaatt tcctcgtaat gattctgtta ttactttcct attctttatt     120
cctctttctt ctgaagatta atgaagttga aaattgaggt ggataaatac aaaaaggtag     180
tgtgatagta taagtatcta agtgcagatg aaagtgtgtt atatatatcc attcaaaatt     240
atgcaagtta gtaattactc agggttaact aaattacttt aatatgctgt tgaacctact     300
ctgttccttg gctagaaaaa attataaaca ggactttgtt agtttgggaa gccaaattga     360
taatattcta tgttctaaaa gttgggctat acataaanta tnaagaaata tggaattta      420
ttcccaggaa tatggggttc atttatgaat antacccggg anagaagttt tgantnaaac     480
cngtttttggt taatacgtta atatgtcctn aatnaacaag gcntgactta tttccaaaaa     540
aaaaaaaaaa aa                                                          552

<210> 80
<211> 476
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(476)
<223> n = A,T,C or G

<400> 80
acagggattt gagatgctaa ggccccagag atcgtttgat ccaaccctct tattttcaga      60
ggggaaaatg gggcctagaa gttacagagc atctagctgg tgcgctggca cccctggcct     120
cacacagact cccgagtagc tgggactaca ggcacacagt cactgaagca ggccctgttt     180
gcaattcacg ttgccacctc caacttaaac attcttcata tgtgatgtcc ttagtcacta     240
aggttaaact ttcccaccca gaaaaggcaa cttagataaa atcttagagt actttcatac     300
tcttctaagt cctcttccag cctcactttg agtcctcctt gggggttgat aggaantntc     360
tcttggcttt ctcaataaaa tctctatcca tctcatgttt aatttggtac gcntaaaaat     420
gctgaaaaaa ttaaaatgtt ctggtttcnc tttaaaaaaa aaaaaaaaaa aaaaaa         476

<210> 81
<211> 232
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(232)
<223> n = A,T,C or G

<400> 81
ttttttttttg tatgccntcn ctgtggngtt attgttgctg ccaccctgga ggagcccagt      60
ttcttctgta tctttctttt ctgggggatc ttcctggctc tgcccctcca ttcccagcct     120
ctcatcccca tcttgcactt ttgctagggt tggaggcgct ttcctggtag ccccctcagag    180
actcagtcag cgggaataag tcctaggggt gggggggtgtg gcaagccggc ct            232

<210> 82
<211> 383
<212> DNA
<213> Homo sapien
```

28

```
<220>
<221> misc_feature
<222> (1)...(383)
<223> n = A,T,C or G

<400> 82
aggcgggagc agaagctaaa gccaaagccc aagaagagtg gcagtgccag cactggtgcc        60
agtaccagta ccaataacat gccagtgcca gtgccagcac cagtggtggc ttcagtgctg       120
gtgccagcct gaccgccact ctcacatttg ggctcttcgc tggccttggt ggagctggtg       180
ccagcaccag tggcagctct ggtgcctgtg gtttctccta caagtgagat tttagatatt       240
gttaatcctg ccagtctttc tcttcaagcc agggtgcatc ctcagaaacc tactcaacac       300
agcactctng gcagccacta tcaatcaatt gaagttgaca ctctgcatta aatctatttg       360
ccatttcaaa aaaaaaaaaa aaa                                              383
```

```
<210> 83
<211> 494
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(494)
<223> n = A,T,C or G

<400> 83
accgaattgg gaccgctggc ttataagcga tcatgtcctc cagtattacc tcaacgagca        60
gggagatcga gtctatacgc tgaagaaatt tgacccgatg ggacaacaga cctgctcagc       120
ccatcctgct cggttctccc cagatgacaa atactctcga caccgaatca ccatcaagaa       180
acgcttcaag gtgctcatga cccagcaacc gcgccctgtc ctctgagggt ccttaaactg       240
atgtcttttc tgccacctgt tacccctcgg agactccgta accaaactct tcggactgtg       300
agccctgatg ccttttttgcc agccatactc tttggcntcc agtctctcgt ggcgattgat       360
tatgcttgtg tgaggcaatc atggtggcat cacccatnaa gggaacacat ttganttttt       420
tttcncatat tttaaattac naccagaata nttcagaata aatgaattga aaaactctta       480
aaaaaaaaaa aaaa                                                       494
```

```
<210> 84
<211> 380
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(380)
<223> n = A,T,C or G

<400> 84
gctggtagcc tatggcgtgg ccacggangg gctcctgagg cacgggacag tgacttccca        60
agtatcctgc gccgcgtctt ctaccgtccc tacctgcaga tcttcgggca gattccccag       120
gaggacatgg acgtggccct catggagcac agcaactgct cgtcggagcc cggcttctgg       180
gcacaccctc ctggggccca ggcgggcacc tgcgtctccc agtatgccaa ctggctggtg       240
gtgctgctcc tcgtcatctt cctgctcgtg gccaacatcc tgctggtcac ttgctcattg       300
ccatgttcag ttacacattc ggcaaagtac agggcaacag cnatctctac tgggaaggcc       360
agcgttnccg cctcatccgg                                                  380
```

```
<210> 85
<211> 481
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
```

29

```
<222> (1)...(481)
<223> n = A,T,C or G

<400> 85
gagttagctc ctccacaacc ttgatgaggt cgtctgcagt ggcctctcgc ttcataccgc      60
tnccatcgtc atactgtagg tttgccacca cctcctgcat cttggggcgg ctaatatcca     120
ggaaactctc aatcaagtca ccgtcnatna aacctgtggc tggttctgtc ttccgctcgg     180
tgtgaaagga tctccagaag gagtgctcga tcttccccac acttttgatg acttattga     240
gtcgattctg catgtccagc aggaggttgt accagctctc tgacagtgag gtcaccagcc     300
ctatcatgcc nttgaacgtg ccgaagaaca ccgagccttg tgtggggggt gnagtctcac     360
ccagattctg cattaccaga nagccgtggc aaaaganatt gacaactcgc ccaggnngaa     420
aaagaacacc tcctggaagt gctngccgct cctcgtccnt tggtggnngc gcntnccttt     480
t                                                                     481


<210> 86
<211> 472
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(472)
<223> n = A,T,C or G

<400> 86
aacatcttcc tgtataatgc tgtgtaatat cgatccgatn ttgtctgctg agaattcatt      60
acttggaaaa gcaacttnaa gcctggacac tggtattaaa attcacaata tgcaacactt     120
taaacagtgt gtcaatctgc tcccttactt tgtcatcacc agtctgggaa taagggtatg     180
ccctattcac acctgttaaa agggcgctaa gcattttttga ttcaacatct ttttttttga    240
cacaagtccg aaaaaagcaa aagtaaacag ttnttaattt gttagccaat tcactttctt     300
catgggacag agccatttga tttaaaaagc aaattgcata atattgagct ttgggagctg     360
atatntgagc ggaagantag cctttctact tcaccagaca caactccttt catattggga     420
tgttnacnaa agttatgtct cttacagatg ggatgctttt gtggcaattc tg            472


<210> 87
<211> 413
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(413)
<223> n = A,T,C or G

<400> 87
agaaaccagt atctctnaaa acaacctctc ataccttgtg gacctaattt tgtgtgcgtg      60
tgtgtgtgcg cgcatattat atagacaggc acatcttttt tacttttgta aaagcttatg     120
cctctttggt atctatatct gtgaaagttt taatgatctg ccataatgtc ttggggacct     180
ttgtcttctg tgtaaatggt actagagaaa acacctatnt tatgagtcaa tctagttngt     240
tttattcgac atgaaggaaa tttccagatn acaacactna caaactctcc cttgactagg     300
ggggacaaag aaaagcanaa ctgaacatna gaaacaattn cctggtgaga aattncataa     360
acagaaattg ggtngtatat tgaaananng catcattnaa acgttttttt ttt           413


<210> 88
<211> 448
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(448)
<223> n = A,T,C or G
```

30

```
        <400> 88
cgcagcgggt cctctctatc tagctccagc ctctcgcctg ccccactccc cgcgtcccgc      60
gtcctagccn accatggccg ggcccctgcg cgccccgctg ctcctgctgg ccatcctggc     120
cgtggccctg gccgtgagcc ccgcggccgg ctccagtccc ggcaagccgc cgcgcctggt     180
gggaggccca tggaccccgc gtggaagaag aaggtgtgcg gcgtgcactg gactttgccg     240
tcggcnanta caacaaaccc gcaacnactt ttaccnagcn cgcgctgcag gttgtgccgc     300
cccaancaaa ttgttactng gggtaantaa ttcttggaag ttgaacctgg gccaaacnng     360
tttaccagaa ccnagccaat tngaacaatt ncccctccat aacagcccct tttaaaaagg     420
gaancantcc tgntcttttc caaatttt                                        448


        <210> 89
        <211> 463
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(463)
        <223> n = A,T,C or G

        <400> 89
gaattttgtg cactggccac tgtgatggaa ccattgggcc aggatgcttt gagtttatca      60
gtagtgattc tgccaaagtt ggtgttgtaa catgagtatg taaaatgtca aaaaattagc     120
agaggtctag gtctgcatat cagcagacag tttgtccgtg tattttgtag ccttgaagtt     180
ctcagtgaca agttnnttct gatgcgaagt tctnattcca gtgttttagt cctttgcatc     240
tttnatgttn agacttgcct ctntnaaatt gcttttgtnt tctgcaggta ctatctgtgg     300
tttaacaaaa tagaannact tctctgcttn gaanatttga atatcttaca tctnaaaatn     360
aattctctcc ccatannaaa acccangccc ttggganaat ttgaaaaang gntccttcnn     420
aattcnnana anttcagntn tcatacaaca naacngganc ccc                       463


        <210> 90
        <211> 400
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(400)
        <223> n = A,T,C or G

        <400> 90
agggattgaa ggtctnttnt actgtcggac tgttcancca ccaactctac aagttgctgt      60
cttccactca ctgtctgtaa gcntnttaac ccagactgta tcttcataaa tagaacaaat     120
tcttcaccag tcacatcttc taggaccttt ttggattcag ttagtataag ctcttccact     180
tcctttgtta agacttcatc tggtaaagtc ttaagttttg tagaaaggaa tttaattgct     240
cgttctctaa caatgtcctc tccttgaagt atttggctga acaacccacc tnaagtccct     300
ttgtgcatcc attttaaata tacttaatag ggcattggtn cactaggtta aattctgcaa     360
gagtcatctg tctgcaaaag ttgcgttagt atatctgcca                           400


        <210> 91
        <211> 480
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(480)
        <223> n = A,T,C or G

        <400> 91
gagctcggat ccaataatct ttgtctgagg gcagcacaca tatncagtgc catggnaact      60
```

31

```
ggtctacccc acatgggagc agcatgccgt agntatataa ggtcattccc tgagtcagac        120
atgcctcttt gactaccgtg tgccagtgct ggtgattctc acacacctcc nnccgctctt        180
tgtggaaaaa ctggcacttg nctggaacta gcaagacatc acttacaaat tcacccacga        240
gacacttgaa aggtgtaaca aagcgactct tgcattgctt tttgtccctc cggcaccagt        300
tgtcaatact aacccgctgg tttgcctcca tcacatttgt gatctgtagc tctggataca        360
tctcctgaca gtactgaaga acttcttctt ttgtttcaaa agcaactctt ggtgcctgtt        420
ngatcaggtt cccatttccc agtccgaatg ttcacatggc atatnttact tcccacaaaa        480
```

        <210> 92
        <211> 477
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(477)
        <223> n = A,T,C or G

        <400> 92
```
atacagccca natcccacca cgaagatgcg cttgttgact gagaacctga tgcggtcact         60
ggtcccgctg tagccccagc gactctccac ctgctggaag cggttgatgc tgcactcctt        120
cccacgcagg cagcagcggg gccggtcaat gaactccact cgtggcttgg ggttgacggt        180
taantgcagg aagaggctga ccacctcgcg gtccaccagg atgcccgact gtgcgggacc        240
tgcagcgaaa ctcctcgatg gtcatgagcg ggaagcgaat gangcccagg gccttgccca        300
gaaccttccg cctgttctct ggcgtcacct gcagctgctg ccgctnacac tcggcctcgg        360
accagcggac aaacggcgtt gaacagccgc acctcacgga tgcccantgt gtcgcgctcc        420
aggaacggcn ccagcgtgtc caggtcaatg tcggtgaanc ctccgcgggt aatggcg          477
```

        <210> 93
        <211> 377
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(377)
        <223> n = A,T,C or G

        <400> 93
```
gaacggctgg accttgcctc gcattgtgct gctggcagga ataccttggc aagcagctcc         60
agtccgagca gccccagacc gctgccgccc gaagctaagc ctgcctctgg ccttcccctc        120
cgcctcaatg cagaaccant agtgggagca ctgtgtttag agttaagagt gaacactgtn        180
tgattttact tgggaatttc ctctgttata tagcttttcc caatgctaat ttccaaacaa        240
caacaacaaa ataacatgtt tgcctgttna gttgtataaa agtangtgat tctgtatnta        300
aagaaatat tactgttaca tatactgctt gcaanttctg tatttattgg tnctctggaa        360
ataaatatat tattaaa                                                       377
```

        <210> 94
        <211> 495
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(495)
        <223> n = A,T,C or G

        <400> 94
```
ccctttgagg ggttagggtc cagttcccag tggaagaaac aggccaggag aantgcgtgc         60
cgagctgang cagatttccc acagtgaccc cagagccctg ggctatagtc tctgacccct        120
ccaaggaaag accaccttct ggggacatgg gctggagggc aggacctaga ggcaccaagg        180
gaaggcccca ttccgggggct gttccccgag gaggaaggga aggggctctg tgtgcccccc       240
```

32

```
acgaggaana ggccctgant cctgggatca nacacccctt cacgtgtatc cccacacaaa    300
tgcaagctca ccaaggtccc ctctcagtcc cttccctaca ccctgaacgg ncactggccc    360
acacccaccc agancancca cccgccatgg ggaatgtnct caaggaatcg cngggcaacg    420
tggactctng tcccnnaagg gggcagaatc tccaatagan gganngaacc cttgctnana    480
aaaaaaaana aaaaa                                                     495
```

```
        <210> 95
        <211> 472
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(472)
        <223> n = A,T,C or G

        <400> 95
ggttacttgg tttcattgcc accacttagt ggatgtcatt tagaaccatt ttgtctgctc     60
cctctggaag ccttgcgcag agcggacttt gtaattgttg gagaataact gctgaatttt    120
tagctgtttt gagttgattc gcaccactgc accacaactc aatatgaaaa ctatttnact    180
tatttattat cttgtgaaaa gtatacaatg aaaattttgt tcatactgta tttatcaagt    240
atgatgaaaa gcaatagata tatattcttt tattatgttn aattatgatt gccattatta    300
atcggcaaaa tgtggagtgt atgttctttt cacagtaata tatgcctttt gtaacttcac    360
ttggttatttt tattgtaaat gaattacaaa attcttaatt taagaaaatg gtangttata    420
tttanttcan taatttcttt ccttgtttac gttaattttg aaaagaatgc at           472
```

```
        <210> 96
        <211> 476
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(476)
        <223> n = A,T,C or G

        <400> 96
ctgaagcatt tcttcaaact tntctacttt tgtcattgat acctgtagta agttgacaat     60
gtggtgaaat ttcaaaatta tatgtaactt ctactagttt tacttctcc cccaagtctt    120
ttttaactca tgatttttac acacacaatc cagaacttat tatatagcct ctaagtcttt    180
attcttcaca gtagatgatg aaagagtcct ccagtgtctt gngcanaatg ttctagntat    240
agctggatac atacngtggg agttctataa actcatacct cagtgggact naaccaaaat    300
tgtgttagtc tcaattccta ccacactgag ggagcctccc aaatcactat attcttatct    360
gcaggtactc ctccagaaaa acngacaggg caggcttgca tgaaaaagtn acatctgcgt    420
tacaaagtct atcttcctca nangtctgtn aaggaacaat ttaatcttct agcttt        476
```

```
        <210> 97
        <211> 479
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(479)
        <223> n = A,T,C or G

        <400> 97
actctttcta atgctgatat gatcttgagt ataagaatgc atatgtcact agaatggata     60
aaataatgct gcaaacttaa tgttcttatg caaaatggaa cgctaatgaa acacagctta    120
caatcgcaaa tcaaaactca caagtgctca tctgttgtag atttagtgta ataagactta    180
gattgtgctc cttcggatat gattgtttct canatcttgg gcaatnttcc ttagtcaaat    240
caggctacta gaattctgtt attggatatn tgagagcatg aaattttta naatacactt    300
```

```
gtgattatna aattaatcac aaatttcact tatacctgct atcagcagct agaaaaacat        360
ntnnttttta natcaaagta ttttgtgttt ggaantgtnn aaatgaaatc tgaatgtggg        420
ttcnatctta ttttttcccn gacnactant tncttttta gggnctattc tganccatc         479
```

        <210> 98
        <211> 461
        <212> DNA
        <213> Homo sapien

        <400> 98
```
agtgacttgt cctccaacaa aaccccttga tcaagtttgt ggcactgaca atcagaccta         60
tgctagttcc tgtcatctat tcgctactaa atgcagactg gaggggacca aaaaggggca        120
tcaactccag ctggattatt ttggagcctg caaatctatt cctacttgta cggactttga       180
agtgattcag tttcctctac ggatgagaga ctggctcaag aatatcctca tgcagcttta       240
tgaagccact ctgaacacgc tggttatcta gatgagaaca gagaaataaa gtcagaaaat       300
ttacctggag aaaagaggct ttggctgggg accatcccat tgaaccttct cttaaggact       360
ttaagaaaaa ctaccacatg ttgtgtatcc tggtgccggc cgtttatgaa ctgaccaccc       420
tttggaataa tcttgacgct cctgaacttg ctcctctgcg a                          461
```

        <210> 99
        <211> 171
        <212> DNA
        <213> Homo sapien

        <400> 99
```
gtggccgcgc gcaggtgttt cctcgtaccg cagggccccc tcccttcccc aggcgtccct         60
cggcgcctct gcgggcccga ggaggagcgg ctggcggggtg ggggggagtgt gacccaccct      120
cggtgagaaa agccttctct agcgatctga gaggcgtgcc ttgggggtac c                 171
```

        <210> 100
        <211> 269
        <212> DNA
        <213> Homo sapien

        <400> 100
```
cggccgcaag tgcaactcca gctggggccg tgcggacgaa gattctgcca gcagttggtc         60
cgactgcgac gacggcggcg gcgacagtcg caggtgcagc gcgggcgcct ggggtcttgc        120
aaggctgagc tgacgccgca gaggtcgtgt cacgtcccac gaccttgacg ccgtcgggga       180
cagccggaac agagcccggt gaagcgggag gcctcgggga gccctcggg aagggcggcc       240
cgagagatac gcaggtgcag gtggccgcc                                        269
```

        <210> 101
        <211> 405
        <212> DNA
        <213> Homo sapien

        <400> 101
```
ttttttttt ttttggaatc tactgcgagc acagcaggtc agcaacaagt ttattttgca         60
gctagcaagg taacagggta gggcatggtt acatgttcag gtcaacttcc tttgtcgtgg        120
ttgattggtt tgtctttatg ggggcggggt ggggtagggg aaacgaagca aataacatgg       180
agtgggtgca ccctccctgt agaacctggt tacaaagctt ggggcagttc acctggtctg       240
tgaccgtcat tttcttgaca tcaatgttat tagaagtcag gatatctttt agagagtcca       300
ctgttctgga gggagattag ggtttcttgc caaatccaac aaaatccact gaaaaagttg       360
gatgatcagt acgaataccg aggcatattc tcatatcggt ggcca                     405
```

        <210> 102
        <211> 470
        <212> DNA
        <213> Homo sapien

        <400> 102
```
ttttttttt ttttttttt ttttttttt ttttttttt ttttttttt ttttttttt         60
```

```
ggcacttaat ccatttttat ttcaaaatgt ctacaaattt aatcccatta tacggtattt      120
tcaaaatcta aattattcaa attagccaaa tccttaccaa ataataccca aaaatcaaaa      180
atatacttct ttcagcaaac ttgttacata aattaaaaaa atatatacgg ctggtgtttt      240
caaagtacaa ttatcttaac actgcaaaca tttttaaggaa ctaaaataaa aaaaaacact     300
ccgcaaaggt taaagggaac aacaaattct tttacaacac cattataaaa atcatatctc      360
aaatcttagg ggaatatata cttcacacgg gatcttaact tttactcact ttgtttattt      420
ttttaaacca ttgtttgggc ccaacacaat ggaatccccc ctggactagt                 470
```

        <210> 103
        <211> 581
        <212> DNA
        <213> Homo sapien

        <400> 103
```
tttttttttt ttttttttga ccccccctctt ataaaaaaca agttaccatt ttattttact     60
tacacatatt tattttataa ttggtattag atattcaaaa ggcagctttt aaaatcaaac      120
taaatggaaa ctgccttaga tacataattc ttaggaatta gcttaaaatc tgcctaaagt      180
gaaaatcttc tctagctctt ttgactgtaa attttttgact cttgtaaaac atccaaattc     240
attttttcttg tctttaaaat tatctaatct ttccattttt tccctattcc aagtcaattt     300
gcttctctag cctcatttcc tagctcttat ctactattag taagtggctt ttttcctaaa      360
agggaaaaca ggaagagaaa tggcacacaa aacaaacatt ttatattcat atttctacct      420
acgttaataa aatagcattt tgtgaagcca gctcaaaaga aggcttagat cctttttatgt      480
ccattttagt cactaaacga tatcaaagtg ccagaatgca aaaggtttgt gaacatttat      540
tcaaaagcta atataagata tttcacatac tcatctttct g                         581
```

        <210> 104
        <211> 578
        <212> DNA
        <213> Homo sapien

        <400> 104
```
tttttttttt tttttttttt tttttctctt cttttttttt gaaatgagga tcgagttttt     60
cactctctag ataggcatg aagaaaactc atctttccag ctttaaaata acaatcaaat       120
ctcttatgct atatcatatt ttaagttaaa ctaatgagtc actggcttat cttctcctga      180
aggaaatctg ttcattcttc tcattcatat agttatatca agtactacct tgcatattga      240
gaggtttttc ttctctattt acacatatat ttccatgtga atttgtatca aacctttatt      300
ttcatgcaaa ctagaaaata atgtttcttt tgcataagag aagagaacaa tatagcatta      360
caaaactgct caaattgttt gttaagttat ccattataat tagttggcag gagctaatac      420
aaatcacatt tacgacagca ataataaaac tgaagtacca gttaaatatc caaaataatt      480
aaaggaacat ttttagcctg ggtataatta gctaattcac tttacaagca tttattagaa      540
tgaattcaca tgttattatt cctagcccaa cacaatgg                             578
```

        <210> 105
        <211> 538
        <212> DNA
        <213> Homo sapien

        <400> 105
```
tttttttttt ttttttcagta ataatcagaa caatatttat ttttatattt aaaattcata     60
gaaaagtgcc ttacatttaa taaaagtttg tttctcaaag tgatcagagg aattagatat      120
gtcttgaaca ccaatattaa tttgaggaaa atacaccaaa atacattaag taaattattt      180
aagatcatag agcttgtaag tgaaaagata aaatttgacc tcagaaactc tgagcattaa      240
aaatccacta ttagcaaata aattactatg gacttcttgc tttaattttg tgatgaatat      300
ggggtgtcac tggtaaacca acacattctg aaggatacat tacttagtga tagattctta      360
tgtactttgc taatacgtgg atatgagttg acaagtttct ctttcttcaa tctttttaagg     420
ggcgagaaat gaggaagaaa agaaaaggat tacgcatact gttctttcta tggaaggatt      480
agatatgttt cctttgccaa tattaaaaaa ataataatgt ttactactag tgaaaccc        538
```

        <210> 106
        <211> 473
        <212> DNA
        <213> Homo sapien

35

```
        <400> 106
tttttttttt tttttagtc aagtttctat ttttattata attaaagtct tggtcatttc      60
atttattagc tctgcaactt acatatttaa attaaagaaa cgttttagac aactgtacaa     120
tttataaatg taaggtgcca ttattgagta atatattcct ccaagagtgg atgtgtccct     180
tctcccacca actaatgaac agcaacatta gtttaatttt attagtagat atacactgct     240
gcaaacgcta attctcttct ccatccccat gtgatattgt gtatatgtgt gagttggtag     300
aatgcatcac aatctacaat caacagcaag atgaagctag gctgggcttt cggtgaaaat     360
agactgtgtc tgtctgaatc aaatgatctg acctatcctc ggtggcaaga actcttcgaa     420
ccgcttcctc aaaggcgctg ccacatttgt ggctctttgc acttgtttca aaa            473
```

```
        <210> 107
        <211> 1621
        <212> DNA
        <213> Homo sapien
```

```
        <400> 107
cgccatggca ctgcagggca tctcggtcat ggagctgtcc ggcctggccc cgggcccgtt      60
ctgtgctatg gtcctggctg acttcggggc gcgtgtggta cgcgtggacc ggcccggctc     120
ccgctacgac gtgagccgct tgggccgggg caagcgctcg ctagtgctgg acctgaagca     180
gccgcgggga gccgccgtgc tgcggcgtct gtgcaagcgg tcggatgtgc tgctggagcc     240
cttccgccgc ggtgtcatgg agaaactcca gctgggccca gagattctgc agcgggaaaa     300
tccaaggctt atttatgcca ggctgagtgg atttggccag tcaggaagct tctgccggtt     360
agctggccac gatatcaact atttggcttt gtcaggtgtt ctctcaaaaa ttggcagaag     420
tggtgagaat ccgtatgccc cgctgaatct cctggctgac tttgctggtg gtggccttat     480
gtgtgcactg ggcattataa tggctctttt tgaccgcaca cgcactgaca agggtcaggt     540
cattgatgca aatatggtgg aaggaacagc atatttaagt tcttttctgt ggaaaactca     600
gaaatcgagt ctgtgggaag cacctcgagg acagaacatg ttggatggtg gagcaccttt     660
ctatacgact tacaggacag cagatgggga attcatggct gttggagcaa tagaacccca     720
gttctacgag ctgctgatca aaggacttgg actaaagtct gatgaacttc ccaatcagat     780
gagcatggat gattggccag aaatgaagaa gaagtttgca gatgtatttg caaagaagac     840
gaaggcagag tggtgtcaaa tctttgacgg cacagatgcc tgtgtgactc cggttctgac     900
ttttgaggag gttgttcatc atgatcacaa caaggaacgg ggctcgttta tcaccagtga     960
ggagcaggac gtgagccccc gccctgcacc tctgctgtta aacacccccag ccatcccttc    1020
tttcaaaagg gatcctttca taggagaaca cactgaggag atacttgaag aatttggatt    1080
cagccgcgaa gagatttatc agcttaactc agataaaatc attgaaagta ataaggtaaa    1140
agctagtctc taacttccag gcccacggct caagtgaatt tgaatactgc atttacagtg    1200
tagagtaaca cataacattg tatgcatgga aacatggagg aacagtatta cagtgtccta    1260
ccactctaat caagaaaaga attacagact ctgattctac agtgatgatt gaattctaaa    1320
aatggttatc attagggctt ttgatttata aaactttggg tacttatact aaattatggt    1380
agttattctg ccttccagtt tgcttgatat atttgttgat attaagattc ttgacttata    1440
ttttgaatgg gttctagtga aaaggaatg atatattctt gaagacatcg atatacattt    1500
atttacactc ttgattctac aatgtagaaa atgaggaaat gccacaaatt gtatggtgat    1560
aaaagtcacg tgaaacaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa    1620
a                                                                     1621
```

```
        <210> 108
        <211> 382
        <212> PRT
        <213> Homo sapien
```

```
        <400> 108
Met Ala Leu Gln Gly Ile Ser Val Met Glu Leu Ser Gly Leu Ala Pro
1               5                   10                  15
Gly Pro Phe Cys Ala Met Val Leu Ala Asp Phe Gly Ala Arg Val Val
            20                  25                  30
Arg Val Asp Arg Pro Gly Ser Arg Tyr Asp Val Ser Arg Leu Gly Arg
        35                  40                  45
Gly Lys Arg Ser Leu Val Leu Asp Leu Lys Gln Pro Arg Gly Ala Ala
    50                  55                  60
Val Leu Arg Arg Leu Cys Lys Arg Ser Asp Val Leu Leu Glu Pro Phe
65                  70                  75                  80
```

```
Arg Arg Gly Val Met Glu Lys Leu Gln Leu Gly Pro Glu Ile Leu Gln
                85              90                  95
Arg Glu Asn Pro Arg Leu Ile Tyr Ala Arg Leu Ser Gly Phe Gly Gln
            100             105             110
Ser Gly Ser Phe Cys Arg Leu Ala Gly His Asp Ile Asn Tyr Leu Ala
        115             120             125
Leu Ser Gly Val Leu Ser Lys Ile Gly Arg Ser Gly Glu Asn Pro Tyr
    130             135             140
Ala Pro Leu Asn Leu Leu Ala Asp Phe Ala Gly Gly Gly Leu Met Cys
145             150             155             160
Ala Leu Gly Ile Ile Met Ala Leu Phe Asp Arg Thr Arg Thr Asp Lys
            165             170             175
Gly Gln Val Ile Asp Ala Asn Met Val Glu Gly Thr Ala Tyr Leu Ser
            180             185             190
Ser Phe Leu Trp Lys Thr Gln Lys Ser Ser Leu Trp Glu Ala Pro Arg
        195             200             205
Gly Gln Asn Met Leu Asp Gly Gly Ala Pro Phe Tyr Thr Thr Tyr Arg
    210             215             220
Thr Ala Asp Gly Glu Phe Met Ala Val Gly Ala Ile Glu Pro Gln Phe
225             230             235             240
Tyr Glu Leu Leu Ile Lys Gly Leu Gly Leu Lys Ser Asp Glu Leu Pro
            245             250             255
Asn Gln Met Ser Met Asp Asp Trp Pro Glu Met Lys Lys Lys Phe Ala
            260             265             270
Asp Val Phe Ala Lys Lys Thr Lys Ala Glu Trp Cys Gln Ile Phe Asp
        275             280             285
Gly Thr Asp Ala Cys Val Thr Pro Val Leu Thr Phe Glu Glu Val Val
    290             295             300
His His Asp His Asn Lys Glu Arg Gly Ser Phe Ile Thr Ser Glu Glu
305             310             315             320
Gln Asp Val Ser Pro Arg Pro Ala Pro Leu Leu Leu Asn Thr Pro Ala
            325             330             335
Ile Pro Ser Phe Lys Arg Asp Pro Phe Ile Gly Glu His Thr Glu Glu
            340             345             350
Ile Leu Glu Glu Phe Gly Phe Ser Arg Glu Glu Ile Tyr Gln Leu Asn
        355             360             365
Ser Asp Lys Ile Ile Glu Ser Asn Lys Val Lys Ala Ser Leu
    370             375             380
```

```
<210> 109
<211> 1524
<212> DNA
<213> Homo sapien

<400> 109
ggcacgaggc tgcgccaggg cctgagcgga ggcgggggca gcctcgccag cggggggcccc      60
gggcctggcc atgcctcact gagccagcgc ctgcgcctct acctcgccga cagctggaac     120
cagtgcgacc tagtggctct cacctgcttc ctcctgggcg tgggctgccg gctgaccccg     180
ggtttgtacc acctgggccg cactgtcctc tgcatcgact tcatggtttt cacggtgcgg     240
ctgcttcaca tcttcacggt caacaaacag ctggggccca agatcgtcat cgtgagcaag     300
atgatgaagg acgtgttctt cttcctcttc ttcctcggcg tgtggctggt agcctatggc     360
gtggccacgg aggggctcct gaggccacgg gacagtgact tcccaagtat cctgcgccgc     420
gtcttctacc gtccctacct gcagatcttc gggcagattc cccaggagga catggacgtg     480
gccctcatgg agcacagcaa ctgctcgtcg gagcccggct tctgggcaca ccctcctggg     540
gcccaggcgg gcacctgcgt ctcccagtat gccaactggc tggtggtgct gctcctcgtc     600
atcttcctgc tcgtggccaa catcctgctg tcaacttgc tcattgccat gttcagttac     660
acattcggca aagtacaggg caacagcgat ctctactgga aggcgcagcg ttaccgcctc     720
atccgggaat tccactctcg gcccgcgctg gccccgccct ttatcgtcat ctcccacttg     780
cgcctcctgc tcaggcaatt gtgcaggcga ccccggagcc cccagccgtc ctccccggcc     840
ctcgagcatt tccgggttta cctttctaag gaagccgagc ggaagctgct aacgtgggaa     900
tcggtgcata aggagaactt tctgctggca cgcgctaggg acaagcggga gagcgactcc     960
gagcgtctga agcgcacgtc ccagaaggtg gacttggcac tgaaacagct gggacacatc    1020
```

```
cgcgagtacg aacagcgcct gaaagtgctg gagcgggagg tccagcagtg tagccgcgtc    1080
ctggggtggg tggccgaggc cctgagccgc tctgccttgc tgcccccagg tgggccgcca    1140
ccccctgacc tgcctgggtc caaagactga gccctgctgg cggacttcaa ggagaagccc    1200
ccacagggga ttttgctcct agagtaaggc tcatctgggc ctcggccccc gcacctggtg    1260
gccttgtcct tgaggtgagc cccatgtcca tctgggccac tgtcaggacc acctttggga    1320
gtgtcatcct tacaaaccac agcatgcccg gctcctccca gaaccagtcc cagcctggga    1380
ggatcaaggc ctggatcccg ggccgttatc catctggagg ctgcagggtc cttggggtaa    1440
cagggaccac agacccctca ccactcacag attcctcaca ctggggaaat aaagccattt    1500
cagaggaaaa aaaaaaaaaa aaaa                                          1524
```

          <210> 110
          <211> 3410
          <212> DNA
          <213> Homo sapien

          <400> 110

```
gggaaccagc ctgcacgcgc tggctccggg tgacagccgc gcgcctcggc caggatctga      60
gtgatgagac gtgtccccac tgaggtgccc cacagcagca ggtgttgagc atgggctgag     120
aagctggacc ggcaccaaag ggctggcaga aatgggcgcc tggctgattc ctaggcagtt     180
ggcggcagca aggaggagag gccgcagctt ctggagcaga gccgagacga agcagttctg     240
gagtgcctga cggccccct gagccctacc cgcctggccc actatggtcc agaggctgtg     300
ggtgagccgc ctgctgcggc accggaaagc ccagctcttg ctggtcaacc tgctaacctt     360
tggcctggag gtgtgtttgg ccgcaggcat cacctatgtg ccgcctctgc tgctggaagt     420
gggggtagag gagaagttca tgaccatggt gctgggcatt ggtccagtgc tgggcctggt     480
ctgtgtcccg ctcctaggct cagccagtga ccactggcgt ggacgctatg ccgccgccg     540
gcccttcatc tgggcactgt ccttgggcat cctgctgagc ctctttctca tcccaagggc     600
cggctggcta gcagggctgc tgtgcccgga tcccaggccc ctggagctgg cactgctcat     660
cctgggcgtg gggctgctgg acttctgtgg ccaggtgtgc ttcactccac tggaggccct     720
gctctctgac ctcttccggg acccggacca ctgtcgccag gcctactctg tctatgcctt     780
catgatcagt cttgggggct gcctggcta cctcctgcct gccattgact gggacaccag     840
tgccctggcc ccctacctgg gcacccagga ggagtgcctc tttggcctgc tcaccctcat     900
cttcctcacc tgcgtagcag ccacactgct ggtggctgag gaggcagcgc tgggcccccac     960
cgagccagca gaagggctgt cggccccctc cttgtcgccc cactgctgtc catgccgggc    1020
ccgcttggct ttccggaacc tgggcgccct gcttccccgg ctgcaccagc tgtgctgccg    1080
catgccccgc accctgcgcc ggctcttcgt ggctgagctg tgcagctgga tggcactcat    1140
gacccttcacg ctgtttttaca cggatttcgt gggcgagggg ctgtaccagg gcgtgcccag    1200
agctgagccg ggcaccgagg cccggagaca ctatgatgaa ggcgttcgga tgggcagcct    1260
ggggctgttc ctgcagtgcg ccatctccct ggtcttctct ctggtcatgg accggctggt    1320
gcagcgattc ggcactcgag cagtctattt ggccagtgtg gcagctttcc ctgtggctgc    1380
cggtgccaca tgcctgtccc acagtgtggc cgtggtgaca gcttcagccg ccctcaccgg    1440
gttcaccttc tcagccctgc agatcctgcc ctacacactg gcctccctct accaccggga    1500
gaagcaggtg ttcctgccca aataccgagg ggacactgga ggtgctagca gtgaggacag    1560
cctgatgacc agcttcctgc caggccctaa gcctggagct cccttccta atggacacgt    1620
gggtgctgga ggcagtggcc tgctcccacc tccacccgcg ctctgcgggg cctctgcctg    1680
tgatgtctcc gtacgtgtgg tggtgggtga gcccaccgag gccagggtgg ttccggcgccg    1740
gggcatctgc ctggacctcg ccatcctgga tagtgccttc ctgctgtccc aggtggcccc    1800
atccctgttt atgggctcca ttgtccagct cagccagtct gtcactgcct atatggtgtc    1860
tgccgcaggc ctgggtctgg tcgccattta ctttgctaca caggtagtat ttgacaagag    1920
cgacttggcc aaatactcag cgtagaaaac ttccagcaca ttggggtgga gggcctgcct    1980
cactgggtcc cagctccccg ctcctgttag ccccatgggg ctgccgggct ggccgccagt    2040
ttctgttgct gccaaagtaa tgtggctctc tgctgccacc ctgtgctgct gaggtgcgta    2100
gctgcacagc tggggggctgg ggcgtccctc tcctctctcc ccagtctcta gggctgcctg    2160
actggaggcc ttccaagggg gtttcagtct ggacttatac agggaggcca gaagggctcc    2220
atgcactgga atgcggggac tctgcaggtg gattacccag gctcagggtt aacagctagc    2280
ctcctagttg agacacacct agagaagggt ttttgggagc tgaataaact cagtcacctg    2340
gtttcccatc tctaagcccc ttaacctgca gcttcgttta atgtagctct tgcatgggag    2400
tttctaggat gaaacactcc tccatgggat ttgaacatat gacttatttg taggggaaga    2460
gtcctgaggg gcaacacaca agaaccaggt cccctcagcc cacagcactg tcttttttgct    2520
gatccacccc cctcttacct tttatcagga tgtggcctgt tggtccttct gttgccatca    2580
cagagacaca ggcatttaaa tatttaactt atttatttaa caaagtagaa gggaatccat    2640
tgctagcttt tctgtgttgg tgtctaatat ttgggtaggg tggggatcc ccaacaatca    2700
ggtcccctga gatagctggt cattgggctg atcattgcca gaatcttctt ctcctggggt    2760
```

```
ctggcccccc aaaatgccta acccaggacc ttggaaattc tactcatccc aaatgataat    2820
tccaaatgct gttacccaag gttagggtgt tgaaggaagg tagagggtgg ggcttcaggt    2880
ctcaacggct tccctaacca cccctcttct cttggcccag cctggttccc cccacttcca    2940
ctcccctcta ctctctctag gactgggctg atgaaggcac tgcccaaaat ttcccctacc    3000
cccaactttc ccctaccccc aactttcccc accagctcca caaccctgtt tggagctact    3060
gcaggaccag aagcacaaag tgcggtttcc caagcctttg tccatctcag cccccagagt    3120
atatctgtgc ttggggaatc tcacacagaa actcaggagc accccctgcc tgagctaagg    3180
gaggtcttat ctctcagggg gggtttaagt gccgtttgca ataatgtcgt cttatttatt    3240
tagcggggtg aatattttat actgtaagtg agcaatcaga gtataatgtt tatggtgaca    3300
aaattaaagg ctttcttata tgtttaaaaa aaaaaaaaa aaaaaaaaa aaaaaaaaaa     3360
aaaaaaaara aaaaaaaaaa aaaaaaaaaa aaaaaataa aaaaaaaaa              3410
```

```
        <210> 111
        <211> 1289
        <212> DNA
        <213> Homo sapien

        <400> 111
agccaggcgt ccctctgcct gcccactcag tggcaacacc cgggagctgt tttgtccttt      60
gtggagcctc agcagttccc tctttcagaa ctcactgcca agagccctga acaggagcca     120
ccatgcagtg cttcagcttc attaagacca tgatgatcct cttcaatttg ctcatctttc     180
tgtgtggtgc agccctgttg gcagtgggca tctgggtgtc aatcgatggg gcatcctttc     240
tgaagatctt cgggccactg tcgtccagtg ccatgcagtt tgtcaacgtg ggctacttcc     300
tcatcgcagc cggcgttgtg gtctttgctc ttggtttcct gggctgctat ggtgctaaga     360
ctgagagcaa gtgtgccctc gtgacgttct tcttcatcct cctcctcatc ttcattgctg     420
aggttgcagc tgctgtggtc gccttggtgt acaccacaat ggctgagcac ttcctgacgt     480
tgctggtagt gcctgccatc aagaaagatt atggttccca ggaagacttc actcaagtgt     540
ggaacaccac catgaaaggg ctcaagtgct gtggcttcac caactatacg gattttgagg     600
actcacccta cttcaaagag aacagtgcct ttccccccatt ctgttgcaat gacaacgtca     660
ccaacacagc caatgaaacc tgcaccaagc aaaaggctca cgaccaaaaa gtagagggtt     720
gcttcaatca gcttttgtat gacatccgaa ctaatgcagt caccgtgggt ggtgtggcag     780
ctggaattgg gggcctcgag ctggctgcca tgattgtgtc catgtatctg tactgcaatc     840
tacaataagt ccacttctgc ctctgccact actgctgcca catgggaact gtgaagaggc     900
accctggcaa gcagcagtga ttgggggagg ggacaggatc taacaatgtc acttgggcca     960
gaatggacct gcccttctg ctccagactt ggggctagat agggaccact ccttttagcg    1020
atgcctgact ttccttccat tggtgggtgg atgggtgggg ggcattccag agcctctaag    1080
gtagccagtt ctgttgccca ttcccccagt ctattaaacc cttgatatgc cccctaggcc    1140
tagtggtgat cccagtgctc tactggggga tgagagaaag gcatttttata gcctgggcat    1200
aagtgaaatc agcagagcct ctgggtggat gtgtagaagg cacttcaaaa tgcataaacc    1260
tgttacaatg ttaaaaaaaa aaaaaaaaa                                      1289
```

```
        <210> 112
        <211> 315
        <212> PRT
        <213> Homo sapien
```

```
        <400> 112
Met Val Phe Thr Val Arg Leu Leu His Ile Phe Thr Val Asn Lys Gln
1               5                   10                  15
Leu Gly Pro Lys Ile Val Ile Val Ser Lys Met Met Lys Asp Val Phe
            20                  25                  30
Phe Phe Leu Phe Phe Leu Gly Val Trp Leu Val Ala Tyr Gly Val Ala
        35                  40                   45
Thr Glu Gly Leu Leu Arg Pro Arg Asp Ser Asp Phe Pro Ser Ile Leu
    50                  55                  60
Arg Arg Val Phe Tyr Arg Pro Tyr Leu Gln Ile Phe Gly Gln Ile Pro
65                  70                  75                  80
Gln Glu Asp Met Asp Val Ala Leu Met Glu His Ser Asn Cys Ser Ser
                85                  90                  95
Glu Pro Gly Phe Trp Ala His Pro Pro Gly Ala Gln Ala Gly Thr Cys
            100                 105                 110
Val Ser Gln Tyr Ala Asn Trp Leu Val Val Leu Leu Leu Val Ile Phe
```

```
          115                       120                       125
Leu Leu Val Ala Asn Ile Leu Leu Val Asn Leu Leu Ile Ala Met Phe
    130                       135                       140
Ser Tyr Thr Phe Gly Lys Val Gln Gly Asn Ser Asp Leu Tyr Trp Lys
145                       150                       155                       160
Ala Gln Arg Tyr Arg Leu Ile Arg Glu Phe His Ser Arg Pro Ala Leu
            165                       170                       175
Ala Pro Pro Phe Ile Val Ile Ser His Leu Arg Leu Leu Leu Arg Gln
            180                       185                       190
Leu Cys Arg Arg Pro Arg Ser Pro Gln Pro Ser Ser Pro Ala Leu Glu
            195                       200                       205
His Phe Arg Val Tyr Leu Ser Lys Glu Ala Glu Arg Lys Leu Leu Thr
    210                       215                       220
Trp Glu Ser Val His Lys Glu Asn Phe Leu Leu Ala Arg Ala Arg Asp
225                       230                       235                       240
Lys Arg Glu Ser Asp Ser Glu Arg Leu Lys Arg Thr Ser Gln Lys Val
            245                       250                       255
Asp Leu Ala Leu Lys Gln Leu Gly His Ile Arg Glu Tyr Glu Gln Arg
            260                       265                       270
Leu Lys Val Leu Glu Arg Glu Val Gln Gln Cys Ser Arg Val Leu Gly
    275                       280                       285
Trp Val Ala Glu Ala Leu Ser Arg Ser Ala Leu Leu Pro Pro Gly Gly
    290                       295                       300
Pro Pro Pro Pro Asp Leu Pro Gly Ser Lys Asp
305                       310                       315

        <210> 113
        <211> 553
        <212> PRT
        <213> Homo sapien

        <400> 113
Met Val Gln Arg Leu Trp Val Ser Arg Leu Leu Arg His Arg Lys Ala
1               5                       10                      15
Gln Leu Leu Leu Val Asn Leu Leu Thr Phe Gly Leu Glu Val Cys Leu
            20                      25                      30
Ala Ala Gly Ile Thr Tyr Val Pro Pro Leu Leu Leu Glu Val Gly Val
    35                      40                      45
Glu Glu Lys Phe Met Thr Met Val Leu Gly Ile Gly Pro Val Leu Gly
    50                      55                      60
Leu Val Cys Val Pro Leu Leu Gly Ser Ala Ser Asp His Trp Arg Gly
65                      70                      75                      80
Arg Tyr Gly Arg Arg Arg Pro Phe Ile Trp Ala Leu Ser Leu Gly Ile
            85                      90                      95
Leu Leu Ser Leu Phe Leu Ile Pro Arg Ala Gly Trp Leu Ala Gly Leu
        100                     105                     110
Leu Cys Pro Asp Pro Arg Pro Leu Glu Leu Ala Leu Leu Ile Leu Gly
    115                     120                     125
Val Gly Leu Leu Asp Phe Cys Gly Gln Val Cys Phe Thr Pro Leu Glu
    130                     135                     140
Ala Leu Leu Ser Asp Leu Phe Arg Asp Pro Asp His Cys Arg Gln Ala
145                     150                     155                     160
Tyr Ser Val Tyr Ala Phe Met Ile Ser Leu Gly Gly Cys Leu Gly Tyr
            165                     170                     175
Leu Leu Pro Ala Ile Asp Trp Asp Thr Ser Ala Leu Ala Pro Tyr Leu
            180                     185                     190
Gly Thr Gln Glu Glu Cys Leu Phe Gly Leu Leu Thr Leu Ile Phe Leu
    195                     200                     205
Thr Cys Val Ala Ala Thr Leu Leu Val Ala Glu Glu Ala Ala Leu Gly
    210                     215                     220
Pro Thr Glu Pro Ala Glu Gly Leu Ser Ala Pro Ser Leu Ser Pro His
225                     230                     235                     240
```

```
Cys Cys Pro Cys Arg Ala Arg Leu Ala Phe Arg Asn Leu Gly Ala Leu
            245             250                 255
Leu Pro Arg Leu His Gln Leu Cys Cys Arg Met Pro Arg Thr Leu Arg
            260             265                 270
Arg Leu Phe Val Ala Glu Leu Cys Ser Trp Met Ala Leu Met Thr Phe
        275             280                 285
Thr Leu Phe Tyr Thr Asp Phe Val Gly Glu Gly Leu Tyr Gln Gly Val
        290             295                 300
Pro Arg Ala Glu Pro Gly Thr Glu Ala Arg Arg His Tyr Asp Glu Gly
305             310                 315                 320
Val Arg Met Gly Ser Leu Gly Leu Phe Leu Gln Cys Ala Ile Ser Leu
                325             330                 335
Val Phe Ser Leu Val Met Asp Arg Leu Val Gln Arg Phe Gly Thr Arg
            340             345                 350
Ala Val Tyr Leu Ala Ser Val Ala Ala Phe Pro Val Ala Ala Gly Ala
        355             360                 365
Thr Cys Leu Ser His Ser Val Ala Val Val Thr Ala Ser Ala Ala Leu
370             375                 380
Thr Gly Phe Thr Phe Ser Ala Leu Gln Ile Leu Pro Tyr Thr Leu Ala
385             390                 395                 400
Ser Leu Tyr His Arg Glu Lys Gln Val Phe Leu Pro Lys Tyr Arg Gly
            405             410                 415
Asp Thr Gly Gly Ala Ser Ser Glu Asp Ser Leu Met Thr Ser Phe Leu
            420             425                 430
Pro Gly Pro Lys Pro Gly Ala Pro Phe Pro Asn Gly His Val Gly Ala
            435             440                 445
Gly Gly Ser Gly Leu Leu Pro Pro Pro Ala Leu Cys Gly Ala Ser
    450             455                 460
Ala Cys Asp Val Ser Val Arg Val Val Val Gly Glu Pro Thr Glu Ala
465             470                 475                 480
Arg Val Val Pro Gly Arg Gly Ile Cys Leu Asp Leu Ala Ile Leu Asp
            485             490                 495
Ser Ala Phe Leu Leu Ser Gln Val Ala Pro Ser Leu Phe Met Gly Ser
        500             505                 510
Ile Val Gln Leu Ser Gln Ser Val Thr Ala Tyr Met Val Ser Ala Ala
        515             520                 525
Gly Leu Gly Leu Val Ala Ile Tyr Phe Ala Thr Gln Val Val Phe Asp
530             535                 540
Lys Ser Asp Leu Ala Lys Tyr Ser Ala
545                 550
```

```
        <210> 114
        <211> 241
        <212> PRT
        <213> Homo sapien

        <400> 114
Met Gln Cys Phe Ser Phe Ile Lys Thr Met Met Ile Leu Phe Asn Leu
1           5               10                  15
Leu Ile Phe Leu Cys Gly Ala Ala Leu Leu Ala Val Gly Ile Trp Val
            20              25                  30
Ser Ile Asp Gly Ala Ser Phe Leu Lys Ile Phe Gly Pro Leu Ser Ser
        35              40                  45
Ser Ala Met Gln Phe Val Asn Val Gly Tyr Phe Leu Ile Ala Ala Gly
    50              55                  60
Val Val Val Phe Ala Leu Gly Phe Leu Gly Cys Tyr Gly Ala Lys Thr
65              70                  75                  80
Glu Ser Lys Cys Ala Leu Val Thr Phe Phe Phe Ile Leu Leu Leu Ile
            85              90                  95
Phe Ile Ala Glu Val Ala Ala Ala Val Val Ala Leu Val Tyr Thr Thr
        100             105                 110
Met Ala Glu His Phe Leu Thr Leu Leu Val Val Pro Ala Ile Lys Lys
```

41

```
              115                    120                    125
Asp Tyr Gly Ser Gln Glu Asp Phe Thr Gln Val Trp Asn Thr Thr Met
        130                    135                    140
Lys Gly Leu Lys Cys Cys Gly Phe Thr Asn Tyr Thr Asp Phe Glu Asp
145                    150                    155                    160
Ser Pro Tyr Phe Lys Glu Asn Ser Ala Phe Pro Pro Phe Cys Cys Asn
                165                    170                    175
Asp Asn Val Thr Asn Thr Ala Asn Glu Thr Cys Thr Lys Gln Lys Ala
            180                    185                    190
His Asp Gln Lys Val Glu Gly Cys Phe Asn Gln Leu Leu Tyr Asp Ile
        195                    200                    205
Arg Thr Asn Ala Val Thr Val Gly Gly Val Ala Ala Gly Ile Gly Gly
    210                    215                    220
Leu Glu Leu Ala Ala Met Ile Val Ser Met Tyr Leu Tyr Cys Asn Leu
225                    230                    235                    240
Gln
```

```
            <210> 115
            <211> 366
            <212> DNA
            <213> Homo sapien

            <400> 115
gctctttctc tcccctcctc tgaatttaat tctttcaact tgcaatttgc aaggattaca     60
catttcactg tgatgtatat tgtgttgcaa aaaaaaaaa gtgtctttgt ttaaaattac    120
ttggtttgtg aatccatctt gctttttccc cattggaact agtcattaac ccatctctga    180
actggtagaa aaacatctga agagctagtc tatcagcatc tgacaggtga attggatggt    240
tctcagaacc atttcaccca gacagcctgt ttctatcctg tttaataaat tagtttgggt    300
tctctacatg cataacaaac cctgctccaa tctgtcacat aaaagtctgt gacttgaagt    360
ttagtc                                                               366

            <210> 116
            <211> 282
            <212> DNA
            <213> Homo sapien

            <220>
            <221> misc_feature
            <222> (1)...(282)
            <223> n = A,T,C or G

            <400> 116
acaaagatga accatttcct atattatagc aaaattaaaa tctacccgta ttctaatatt     60
gagaaatgag atnaaacaca atnttataaa gtctacttag agaagatcaa gtgacctcaa    120
agactttact attttcatat tttaagacac atgatttatc ctattttagt aacctggttc    180
atacgttaaa caaaggataa tgtgaacagc agagaggatt tgttggcaga aaatctatgt    240
tcaatctnga actatctana tcacagacat ttctattcct tt                       282

            <210> 117
            <211> 305
            <212> DNA
            <213> Homo sapien

            <220>
            <221> misc_feature
            <222> (1)...(305)
            <223> n = A,T,C or G

            <400> 117
acacatgtcg cttcactgcc ttcttagatg cttctggtca acatanagga acagggacca     60
tatttatcct ccctcctgaa acaattgcaa aataanacaa aatatatgaa acaattgcaa    120
```

42

```
aataaggcaa aatatatgaa acaacaggtc tcgagatatt ggaaatcagt caatgaagga      180
tactgatccc tgatcactgt cctaatgcag gatgtgggaa acagatgagg tcacctctgt      240
gactgcccca gcttactgcc tgtagagagt ttctangctg cagttcagac agggagaaat      300
tgggt                                                                  305
```

        <210> 118
        <211> 71
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(71)
        <223> n = A,T,C or G

        <400> 118
```
accaaggtgt ntgaatctct gacgtgggga tctctgattc ccgcacaatc tgagtggaaa       60
aantcctggg t                                                            71
```

        <210> 119
        <211> 212
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(212)
        <223> n = A,T,C or G

        <400> 119
```
actccggttg gtgtcagcag cacgtggcat tgaacatngc aatgtggagc ccaaaccaca       60
gaaaatgggg tgaaattggc caactttcta tnaacttatg ttggcaantt tgccaccaac      120
agtaagctgg cccttctaat aaaagaaaat tgaaaggttt ctcactaanc ggaattaant      180
aatggantca aganactccc aggcctcagc gt                                    212
```

        <210> 120
        <211> 90
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(90)
        <223> n = A,T,C or G

        <400> 120
```
actcgttgca natcaggggc cccccagagt caccgttgca ggagtccttc tggtcttgcc       60
ctccgccggc gcagaacatg ctggggtggt                                       90
```

        <210> 121
        <211> 218
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(218)
        <223> n = A,T,C or G

        <400> 121
```
tgtancgtga anacgacaga naggggttgtc aaaaatggag aanccttgaa gtcattttga      60
gaataagatt tgctaaaaga tttggggcta aaacatggtt attgggagac atttctgaag      120
```

43

```
atatncangt aaattangga atgaattcat ggttcttttg ggaattcctt tacgatngcc        180
agcatanact tcatgtgggg atancagcta cccttgta                               218

        <210> 122
        <211> 171
        <212> DNA
        <213> Homo sapien

        <400> 122
tagggggtgta tgcaactgta aggacaaaaa ttgagactca actggcttaa ccaataaagg        60
catttgttag ctcatggaac aggaagtcgg atggtggggc atcttcagtg ctgcatgagt        120
caccacccccg gcggggtcat ctgtgccaca ggtccctgtt gacagtgcgg t               171

        <210> 123
        <211> 76
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(76)
        <223> n = A,T,C or G

        <400> 123
tgtagcgtga agacnacaga atggtgtgtg ctgtgctatc caggaacaca tttattatca        60
ttatcaanta ttgtgt                                                       76

        <210> 124
        <211> 131
        <212> DNA
        <213> Homo sapien

        <400> 124
acctttccccc aaggccaatg tcctgtgtgc taactggccg gctgcaggac agctgcaatt        60
caatgtgctg ggtcatatgg aggggaggag actctaaaat agccaatttt attctcttgg        120
ttaagatttg t                                                            131

        <210> 125
        <211> 432
        <212> DNA
        <213> Homo sapien

        <400> 125
actttatcta ctggctatga aatagatggt ggaaaattgc gttaccaact ataccactgg        60
cttgaaaaag aggtgatagc tcttcagagg acttgtgact tttgctcaga tgctgaagaa        120
ctacagtctg catttggcag aaatgaagat gaatttggat taaatgagga tgctgaagat        180
ttgcctcacc aaacaaaagt gaaacaactg agagaaaatt ttcaggaaaa aagacagtgg        240
ctcttgaagt atcagtcact tttgagaatg tttcttagtt actgcatact tcatggatcc        300
catggtgggg gtcttgcatc tgtaagaatg gaattgattt tgcttttgca agaatctcag        360
caggaaacat cagaaccact attttctagc cctctgtcag agcaaacctc agtgcctctc        420
ctctttgctt gt                                                           432

        <210> 126
        <211> 112
        <212> DNA
        <213> Homo sapien

        <400> 126
acacaacttg aatagtaaaa tagaaactga gctgaaattt ctaattcact ttctaaccat        60
agtaagaatg atatttcccc ccagggatca ccaaatattt ataaaaattt gt               112

        <210> 127
```

44

```
        <211> 54
        <212> DNA
        <213> Homo sapien

        <400> 127
accacgaaac cacaaacaag atggaagcat caatccactt gccaagcaca gcag          54

        <210> 128
        <211> 323
        <212> DNA
        <213> Homo sapien


        <400> 128
acctcattag taattgtttt gttgtttcat tttttctaa tgtctcccct ctaccagctc     60
acctgagata acagaatgaa aatggaagga cagccagatt tctcctttgc tctctgctca   120
ttctctctga agtctaggtt acccattttg gggacccatt ataggcaata aacacagttc   180
ccaaagcatt tggacagttt cttgttgtgt tttagaatgg ttttcctttt tcttagcctt   240
ttcctgcaaa aggctcactc agtcccttgc ttgctcagtg gactgggctc cccagggcct   300
aggctgcctt cttttccatg tcc                                          323

        <210> 129
        <211> 192
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(192)
        <223> n = A,T,C or G


        <400> 129
acatacatgt gtgtatattt ttaaatatca cttttgtatc actctgactt tttagcatac     60
tgaaaacaca ctaacataat ttntgtgaac catgatcaga tacaacccaa atcattcatc   120
tagcacattc atctgtgata naaagatagg tgagtttcat ttccttcacg ttggccaatg   180
gataaacaaa gt                                                       192

        <210> 130
        <211> 362
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(362)
        <223> n = A,T,C or G


        <400> 130
cccttttta tggaatgagt agactgtatg tttgaanatt tanccacaac ctctttgaca     60
tataatgacg caacaaaaag gtgctgttta gtcctatggt tcagtttatg cccctgacaa   120
gtttccattg tgttttgccg atcttctggc taatcgtggt atcctccatg ttattagtaa   180
ttctgtattc cattttgtta acgcctggta gatgtaacct gctangaggc taactttata   240
cttatttaaa agctcttatt ttgtggtcat taaaatggca atttatgtgc agcactttat   300
tgcagcagga agcacgtgtg ggttggttgt aaagctcttt gctaatctta aaaagtaatg   360
gg                                                                  362

        <210> 131
        <211> 332
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
```

45

```
<222> (1)...(332)
<223> n = A,T,C or G

<400> 131
cttttttgaaa gatcgtgtcc actcctgtgg acatcttgtt ttaatggagt ttcccatgca       60
gtangactgg tatggttgca gctgtccaga taaaaacatt tgaagagctc caaaatgaga      120
gttctcccag gttcgccctg ctgctccaag tctcagcagc agcctctttt aggaggcatc      180
ttctgaacta gattaaggca gcttgtaaat ctgatgtgat ttggtttatt atccaactaa      240
cttccatctg ttatcactgg agaaagccca gactccccan gacnggtacg gattgtgggc      300
atanaaggat tgggtgaagc tggcgttgtg gt                                    332


        <210> 132
        <211> 322
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(322)
        <223> n = A,T,C or G

        <400> 132
actttttgcca ttttgtatat ataaacaatc ttgggacatt ctcctgaaaa ctaggtgtcc       60
agtggctaag agaactcgat ttcaagcaat tctgaaagga aaaccagcat gacacagaat      120
ctcaaattcc caaacagggg ctctgtggga aaaatgaggg aggacctttg tatctcgggt      180
tttagcaagt taaaatgaan atgacaggaa aggcttattt atcaacaaag agaagagttg      240
ggatgcttct aaaaaaaaact ttggtagaga aaataggaat gctnaatcct agggaagcct      300
gtaacaatct acaattggtc ca                                              322


        <210> 133
        <211> 278
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(278)
        <223> n = A,T,C or G

        <400> 133
acaagccttc acaagtttaa ctaaattggg attaatcttt ctgtanttat ctgcataatt       60
cttgttttttc tttccatctg gctcctgggt tgacaatttg tggaaacaac tctattgcta      120
ctatttaaaa aaaatcacaa atctttccct ttaagctatg ttnaattcaa actattcctg      180
ctattcctgt tttgtcaaag aaattatatt tttcaaaata tgtntatttg tttgatgggt      240
cccacgaaac actaataaaa accacagaga ccagcctg                              278


        <210> 134
        <211> 121
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(121)
        <223> n = A,T,C or G

        <400> 134
gtttanaaaa cttgtttagc tccatagagg aaagaatgtt aaactttgta ttttaaaaca       60
tgattctctg aggttaaact tggttttcaa atgttatttt tacttgtatt ttgcttttgg      120
t                                                                     121


        <210> 135
```

46

```
<211> 350
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(350)
<223> n = A,T,C or G

<400> 135
acttanaacc atgcctagca catcagaatc cctcaaagaa catcagtata atcctatacc       60
atancaagtg gtgactggtt aagcgtgcga caaaggtcag ctggcacatt acttgtgtgc      120
aaacttgata cttttgttct aagtaggaac tagtatacag tncctaggan tggtactcca      180
gggtgccccc caactcctgc agccgctcct ctgtgccagn ccctgnaagg aactttcgct      240
ccacctcaat caagccctgg gccatgctac ctgcaattgg ctgaacaaac gtttgctgag      300
ttcccaagga tgcaaagcct ggtgctcaac tcctggggcg tcaactcagt                 350

<210> 136
<211> 399
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(399)
<223> n = A,T,C or G

<400> 136
tgtaccgtga agacgacaga agttgcatgg cagggacagg gcagggccga ggccagggtt       60
gctgtgattg tatccgaata ntcctcgtga gaaaagataa tgagatgacg tgagcagcct      120
gcagacttgt gtctgccttc aanaagccag acaggaaggc cctgcctgcc ttggctctga      180
cctggcggcc agccagccag ccacaggtgg gcttcttcct tttgtggtga caacnccaag      240
aaaactgcag aggcccaggg tcaggtgtna gtgggtangt gaccataaaa caccaggtgc      300
tcccaggaac ccgggcaaag gccatcccca cctacagcca gcatgcccac tggcgtgatg      360
ggtgcagang gatgaagcag ccagntgttc tgctgtggt                             399

<210> 137
<211> 165
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(165)
<223> n = A,T,C or G

<400> 137
actggtgtgg tnggggggtga tgctggtggt anaagttgan gtgacttcan gatggtgtgt     60
ggaggaagtg tgtgaacgta gggatgtaga ngttttggcc gtgctaaatg agcttcggga      120
ttggctggtc ccactggtgg tcactgtcat tggtggggtt cctgt                      165

<210> 138
<211> 338
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(338)
<223> n = A,T,C or G

<400> 138
```

```
actcactgga atgccacatt cacaacagaa tcagaggtct gtgaaaacat taatggctcc      60
ttaacttctc cagtaagaat cagggacttg aaatggaaac gttaacagcc acatgcccaa     120
tgctgggcag tctcccatgc cttccacagt gaaagggctt gagaaaaatc acatccaatg     180
tcatgtgttt ccagccacac caaaaggtgc ttggggtgga gggctggggg catananggt     240
cangcctcag gaagcctcaa gttccattca gctttgccac tgtacattcc ccatntttaa     300
aaaaactgat gccttttttt tttttttttg taaaattc                            338
```

        <210> 139
        <211> 382
        <212> DNA
        <213> Homo sapien

        <400> 139
```
gggaatcttg gttttttggca tctggtttgc ctatagccga ggccactttg acagaacaaa     60
gaaagggact tcgagtaaga aggtgattta cagccagcct agtgcccgaa gtgaaggaga     120
attcaaacag acctcgtcat tcctggtgtg agcctggtcg gctcaccgcc tatcatctgc     180
atttgcctta ctcaggtgct accggactct ggccctgat gtctgtagtt tcacaggatg     240
ccttatttgt cttctacacc ccacagggcc ccctacttct tcggatgtgt ttttaataat     300
gtcagctatg tgccccatcc tccttcatgc cctccctccc tttcctacca ctgctgagtg     360
gcctggaact tgtttaaagt gt                                              382
```

        <210> 140
        <211> 200
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(200)
        <223> n = A,T,C or G

        <400> 140
```
accaaanctt ctttctgttg tgttngattt tactataggg gtttngcttn ttctaaanat      60
acttttcatt taacancttt tgttaagtgt caggctgcac tttgctccat anaattattg     120
ttttcacatt tcaacttgta tgtgtttgtc tcttanagca ttggtgaaat cacatatttt     180
atattcagca taaaggagaa                                                 200
```

        <210> 141
        <211> 335
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(335)
        <223> n = A,T,C or G

        <400> 141
```
actttatttt caaaacactc atatgttgca aaaaacacat agaaaaataa agtttggtgg      60
gggtgctgac taaacttcaa gtcacagact tttatgtgac agattggagc agggtttgtt     120
atgcatgtag agaacccaaa ctaatttatt aaacaggata gaaacaggct gtctgggtga     180
aatggttctg agaaccatcc aattcacctg tcagatgctg atanactagc tcttcagatg     240
tttttctacc agttcagaga tnggttaatg actanttcca atggggaaaa agcaagatgg     300
attcacaaac caagtaattt taaacaaaga cactt                               335
```

        <210> 142
        <211> 459
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature

48

```
        <222> (1)...(459)
        <223> n = A,T,C or G

        <400> 142
accaggttaa tattgccaca tatatccttt ccaattgcgg gctaaacaga cgtgtattta      60
gggttgttta aagacaaccc agcttaatat caagagaaat tgtgaccttt catggagtat     120
ctgatggaga aaacactgag ttttgacaaa tcttatttta ttcagatagc agtctgatca     180
cacatggtcc aacaacactc aaataataaa tcaaatatna tcagatgtta aagattggtc     240
ttcaaacatc atagccaatg atgccccgct tgcctataat ctctccgaca taaaaccaca     300
tcaacacctc agtggccacc aaaccattca gcacagcttc cttaactgtg agctgtttga     360
agctaccagt ctgagcacta ttgactatnt ttttcangct ctgaatagct ctagggatct     420
cagcangggt gggaggaacc agctcaacct tggcgtant                           459

        <210> 143
        <211> 140
        <212> DNA
        <213> Homo sapien

        <400> 143
acatttcctt ccaccaagtc aggactcctg gcttctgtgg gagttcttat cacctgaggg      60
aaatccaaac agtctctcct agaaaggaat agtgtcacca accccaccca tctccctgag     120
accatccgac ttccctgtgt                                                140

        <210> 144
        <211> 164
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(164)
        <223> n = A,T,C or G

        <400> 144
acttcagtaa caacatacaa taacaacatt aagtgtatat tgccatcttt gtcattttct      60
atctatacca ctctcccttc tgaaaacaan aatcactanc caatcactta tacaaatttg     120
aggcaattaa tccatatttg ttttcaataa ggaaaaaaag atgt                     164

        <210> 145
        <211> 303
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(303)
        <223> n = A,T,C or G

        <400> 145
acgtagacca tccaactttg tatttgtaat ggcaaacatc cagnagcaat tcctaaacaa      60
actggagggt atttataccc aattatccca ttcattaaca tgccctcctc ctcaggctat     120
gcaggacagc tatcataagt cggcccaggc atccagatac taccatttgt ataaacttca     180
gtaggggagt ccatccaagt gacaggtcta atcaaaggag gaaatggaac ataagcccag     240
tagtaaaatn ttgcttagct gaaacagcca caaaagactt accgccgtgg tgattaccat     300
caa                                                                   303

        <210> 146
        <211> 327
        <212> DNA
        <213> Homo sapien

        <220>
```

49

```
<221> misc_feature
<222> (1)...(327)
<223> n = A,T,C or G

<400> 146
actgcagctc aattagaagt ggtctctgac tttcatcanc ttctccctgg gctccatgac      60
actggcctgg agtgactcat tgctctggtt ggttgagaga gctcctttgc caacaggcct     120
ccaagtcagg gctgggattt gtttcctttc cacattctag caacaatatg ctggccactt     180
cctgaacagg gagggtggga ggagccagca tggaacaagc tgccactttc taaagtagcc     240
agacttgccc ctgggcctgt cacacctact gatgaccttc tgtgcctgca ggatggaatg     300
tagggggtgag ctgtgtgact ctatggt                                        327

        <210> 147
        <211> 173
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(173)
        <223> n = A,T,C or G

        <400> 147
acattgtttt tttgagataa agcattgana gagctctcct taacgtgaca caatggaagg      60
actggaacac atacccacat ctttgttctg agggataatt ttctgataaa gtcttgctgt     120
atattcaagc acatatgtta tatattattc agttccatgt ttatagccta gtt           173

        <210> 148
        <211> 477
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(477)
        <223> n = A,T,C or G

        <400> 148
acaaccactt tatctcatcg aattttaac ccaaactcac tcactgtgcc tttctatcct        60
atgggatata ttatttgatg ctccatttca tcacacatat atgaataata cactcatact      120
gccctactac ctgctgcaat aatcacattc ccttcctgtc ctgaccctga agccattggg      180
gtggtcctag tggccatcag tccangcctg caccttgagc ccttgagctc cattgctcac      240
nccancccac ctcaccgacc ccatcctctt acacagctac ctccttgctc tctaacccca      300
tagattatnt ccaaattcag tcaattaagt tactattaac actctacccg acatgtccag      360
caccactggt aagccttctc cagccaacac acacacacac acacncacac acacacatat      420
ccaggcacag gctacctcat cttcacaatc accccttttaa ttaccatgct atggtgg        477

        <210> 149
        <211> 207
        <212> DNA
        <213> Homo sapien

        <400> 149
acagttgtat tataatatca agaaataaac ttgcaatgag agcatttaag agggaagaac       60
taacgtattt tagagagcca aggaaggttt ctgtggggag tgggatgtaa ggtgggggcct     120
gatgataaat aagagtcagc caggtaagtg ggtggtgtgg tatgggcaca gtgaagaaca     180
tttcaggcag agggaacagc agtgaaa                                          207

        <210> 150
        <211> 111
        <212> DNA
        <213> Homo sapien
```

50

```
        <220>
        <221> misc_feature
        <222> (1)...(111)
        <223> n = A,T,C or G

        <400> 150
accttgattt cattgctgct ctgatggaaa cccaactatc taatttagct aaaacatggg        60
cacttaaatg tggtcagtgt ttggacttgt taactantgg catctttggg t                111

        <210> 151
        <211> 196
        <212> DNA
        <213> Homo sapien

        <400> 151
agcgcggcag gtcatattga acattccaga tacctatcat tactcgatgc tgttgataac        60
agcaagatgg ctttgaactc agggtcacca ccagctattg gaccttacta tgaaaaccat       120
ggataccaac cggaaaaccc ctatcccgca cagcccactg tggtccccac tgtctacgag       180
gtgcatccgg ctcagt                                                      196

        <210> 152
        <211> 132
        <212> DNA
        <213> Homo sapien

        <400> 152
acagcacttt cacatgtaag aagggagaaa ttcctaaatg taggagaaag ataacagaac        60
cttccccttt tcatctagtg gtggaaacct gatgctttat gttgacagga atagaaccag       120
gagggagttt gt                                                          132

        <210> 153
        <211> 285
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(285)
        <223> n = A,T,C or G

        <400> 153
acaanaccca nganaggcca ctggccgtgg tgtcatggcc tccaaacatg aaagtgtcag        60
cttctgctct tatgtcctca tctgacaact ctttaccatt tttatcctcg ctcagcagga       120
gcacatcaat aaagtccaaa gtcttggact tggccttggc ttggaggaag tcatcaacac       180
cctggctagt gagggtgcgg cgccgctcct ggatgacggc atctgtgaag tcgtgcacca       240
gtctgcaggc cctgtggaag cgccgtccac acggagtnag gaatt                       285

        <210> 154
        <211> 333
        <212> DNA
        <213> Homo sapien

        <400> 154
accacagtcc tgttgggcca gggcttcatg accctttctg tgaaaagcca tattatcacc        60
accccaaatt tttccttaaa tatctttaac tgaaggggtc agcctcttga ctgcaaagac       120
cctaagccgg ttacacagct aactcccact ggccctgatt tgtgaaattg ctgctgcctg       180
attggcacag gagtcgaagg tgttcagctc ccctcctccg tggaacgaga ctctgatttg       240
agtttcacaa attctcgggc cacctcgtca ttgctcctct gaaataaaat ccggagaatg       300
gtcaggcctg tctcatccat atggatcttc cgg                                   333

        <210> 155
```

51

```
        <211> 308
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(308)
        <223> n = A,T,C or G

        <400> 155
actggaaata ataaaaccca catcacagtg ttgtgtcaaa gatcatcagg gcatggatgg      60
gaaagtgctt tgggaactgt aaagtgccta acacatgatc gatgattttt gttataatat     120
ttgaatcacg gtgcatacaa actctcctgc ctgctcctcc tgggccccag ccccagcccc     180
atcacagctc actgctctgt tcatccaggc ccagcatgta gtggctgatt cttcttggct     240
gcttttagcc tccanaagtt tctctgaagc caaccaaacc tctangtgta aggcatgctg     300
gccctggt                                                              308

        <210> 156
        <211> 295
        <212> DNA
        <213> Homo sapien

        <400> 156
accttgctcg gtgcttggaa catattagga actcaaaata tgagatgata acagtgccta      60
ttattgatta ctgagagaac tgttagacat ttagttgaag attttctaca caggaactga     120
gaataggaga ttatgtttgg ccctcatatt ctctcctatc ctccttgcct cattctatgt     180
ctaatatatt ctcaatcaaa taaggttagc ataatcagga aatcgaccaa ataccaatat     240
aaaaccagat gtctatcctt aagattttca aatagaaaac aaattaacag actat          295

        <210> 157
        <211> 126
        <212> DNA
        <213> Homo sapien

        <400> 157
acaagtttaa atagtgctgt cactgtgcat gtgctgaaat gtgaaatcca ccacatttct      60
gaagagcaaa acaaattctg tcatgtaatc tctatcttgg gtcgtgggta tatctgtccc     120
cttagt                                                                126

        <210> 158
        <211> 442
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(442)
        <223> n = A,T,C or G

        <400> 158
acccactggt cttggaaaca cccatcctta atacgatgat ttttctgtcg tgtgaaaatg      60
aanccagcag gctgccccta gtcagtcctt ccttccagag aaaaagagat ttgagaaagt     120
gcctgggtaa ttcaccatta atttcctccc ccaaactctc tgagtcttcc cttaatattt     180
ctggtggttc tgaccaaagc aggtcatggt ttgttgagca tttgggatcc cagtgaagta     240
natgtttgta gccttgcata cttagccctt cccacgcaca aacggagtgg cagagtggtg     300
ccaaccctgt tttcccagtc cacgtagaca gattcacagt gcggaattct ggaagctgga     360
nacagacggg ctctttgcag agccgggact ctgagangga catgagggcc tctgcctctg     420
tgttcattct ctgatgtcct gt                                              442

        <210> 159
        <211> 498
        <212> DNA
```

52

```
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(498)
        <223> n = A,T,C or G

        <400> 159
acttccaggt aacgttgttg tttccgttga gcctgaactg atgggtgacg ttgtaggttc    60
tccaacaaga actgaggttg cagagcgggt agggaagagt gctgttccag ttgcacctgg   120
gctgctgtgg actgttgttg attcctcact acggcccaag gttgtggaac tggcanaaag   180
gtgtgttgtt gganttgagc tcgggcggct gtggtaggtt gtgggctctt caacaggggc   240
tgctgtggtg ccgggangtg aangtgttgt gtcacttgag cttggccagc tctggaaagt   300
antanattct tcctgaaggc cagcgcttgt ggagctggca ngggtcantg ttgtgtgtaa   360
cgaaccagtg ctgctgtggg tgggtgtana tcctccacaa agcctgaagt tatggtgtcn   420
tcaggtaana atgtggtttc agtgtccctg ggcngctgtg gaaggttgta nattgtcacc   480
aagggaataa gctgtggt                                                 498

        <210> 160
        <211> 380
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(380)
        <223> n = A,T,C or G

        <400> 160
acctgcatcc agcttccctg ccaaactcac aaggagacat caacctctag acagggaaac    60
agcttcagga tacttccagg agacagagcc accagcagca aaacaaatat tcccatgcct   120
ggagcatggc atagaggaag ctganaaatg tggggtctga ggaagccatt tgagtctggc   180
cactagacat ctcatcagcc acttgtgtga agagatgccc catgacccca gatgcctctc   240
ccacccttac ctccatctca cacacttgag ctttccactc tgtataattc taacatcctg   300
gagaaaaatg gcagtttgac cgaacctgtt cacaacggta gaggctgatt tctaacgaaa   360
cttgtagaat gaagcctgga                                               380

        <210> 161
        <211> 114
        <212> DNA
        <213> Homo sapien

        <400> 161
actccacatc ccctctgagc aggcggttgt cgttcaaggt gtatttggcc ttgcctgtca    60
cactgtccac tggcccctta tccacttggt gcttaatccc tcgaaagagc atgt         114

        <210> 162
        <211> 177
        <212> DNA
        <213> Homo sapien

        <400> 162
actttctgaa tcgaatcaaa tgatacttag tgtagtttta atatcctcat atatatcaaa    60
gttttactac tctgataatt ttgtaaacca ggtaaccaga acatccagtc atacagcttt   120
tggtgatata taacttggca ataacccagt ctggtgatac ataaaactac tcactgt      177

        <210> 163
        <211> 137
        <212> DNA
        <213> Homo sapien

        <220>
```

53

```
        <221> misc_feature
        <222> (1)...(137)
        <223> n = A,T,C or G


        <400> 163
catttataca gacaggcgtg aagacattca cgacaaaaac gcgaaattct atcccgtgac          60
canagaaggc agctacggct actcctacat cctggcgtgg gtggccttcg cctgcacctt         120
catcagcggc atgatgt                                                        137


        <210> 164
        <211> 469
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(469)
        <223> n = A,T,C or G


        <400> 164
cttatcacaa tgaatgttct cctgggcagc gttgtgatct ttgccacctt cgtgacttta          60
tgcaatgcat catgctattt catacctaat gagggagttc caggagattc aaccaggaaa         120
tgcatggatc tcaaaggaaa caaacaccca ataaactcgg agtggcagac tgacaactgt         180
gagacatgca cttgctacga aacagaaatt tcatgttgca cccttgtttc tacacctgtg         240
ggttatgaca aagacaactg ccaaagaatc ttcaagaagg aggactgcaa gtatatcgtg         300
gtggagaaga aggacccaaa aaagacctgt tctgtcagtg aatggataat ctaatgtgct         360
tctagtaggc acagggctcc caggccaggc ctcattctcc tctggcctct aatagtcaat         420
gattgtgtag ccatgcctat cagtaaaaag atntttgagc aaacacttt                    469


        <210> 165
        <211> 195
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(195)
        <223> n = A,T,C or G


        <400> 165
acagtttttt atanatatcg acattgccgg cacttgtgtt cagtttcata aagctggtgg          60
atccgctgtc atccactatt ccttggctag agtaaaaatt attcttatag cccatgtccc         120
tgcaggccgc ccgcccgtag ttctcgttcc agtcgtcttg gcacacaggg tgccaggact         180
tcctctgaga tgagt                                                          195


        <210> 166
        <211> 383
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(383)
        <223> n = A,T,C or G


        <400> 166
acatcttagt agtgtggcac atcaggggc catcagggtc acagtcactc atagcctcgc           60
cgaggtcgga gtccacacca ccggtgtagg tgtgctcaat cttgggcttg gcgcccacct         120
ttggagaagg gatatgctgc acacacatgt ccacaaagcc tgtgaactcg ccaaagaatt         180
tttgcagacc agcctgagca aggggcggat gttcagcttc agctcctcct tcgtcaggtg         240
gatgccaacc tcgtctangg tccgtgggaa gctggtgtcc acntcaccta caacctgggc         300
gangatctta taaagaggct ccnagataaa ctccacgaaa cttctctggg agctgctagt         360
```

54

```
ngggggcctttt ttggtgaact ttc                                          383
```

```
        <210> 167
        <211> 247
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(247)
        <223> n = A,T,C or G

        <400> 167
acagagccag accttggcca taaatgaanc agagattaag actaaacccc aagtcganat    60
tggagcagaa actggagcaa gaagtgggcc tggggctgaa gtagagacca aggccactgc   120
tatanccata cacagagcca actctcaggc caaggcnatg gttggggcag anccagagac   180
tcaatctgan tccaaagtgg tggctggaac actggtcatg acanaggcag tgactctgac   240
tgangtc                                                             247

        <210> 168
        <211> 273
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(273)
        <223> n = A,T,C or G

        <400> 168
acttctaagt tttctagaag tggaaggatt gtantcatcc tgaaaatggg tttacttcaa    60
aatccctcan ccttgttctt cacnactgtc tatactgana gtgtcatgtt tccacaaagg   120
gctgacacct gagcctgnat tttcactcat ccctgagaag ccctttccag tagggtgggc   180
aattcccaac ttccttgcca caagcttccc aggctttctc ccctggaaaa ctccagcttg   240
agtcccagat acactcatgg gctgccctgg gca                                273

        <210> 169
        <211> 431
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(431)
        <223> n = A,T,C or G

        <400> 169
acagccttgg cttccccaaa ctccacagtc tcagtgcaga aagatcatct tccagcagtc    60
agctcagacc agggtcaaag gatgtgacat caacagtttc tggtttcaga acaggttcta   120
ctactgtcaa atgacccccc atacttcctc aaaggctgtg gtaagttttg cacaggtgag   180
ggcagcagaa aggggtant tactgatgga caccatcttc tctgtatact ccacactgac   240
cttgccatgg gcaaaggccc ctaccacaaa aacaatagga tcactgctgg gcaccagctc   300
acgcacatca ctgacaaccg ggatggaaaa agaantgcca actttcatac atccaactgg   360
aaagtgatct gatactggat tcttaattac cttcaaaagc ttctgggggc catcagctgc   420
tcgaacactg a                                                        431

        <210> 170
        <211> 266
        <212> DNA
        <213> Homo sapien

        <220>
```

```
        <221> misc_feature
        <222> (1)...(266)
        <223> n = A,T,C or G

        <400> 170
acctgtgggc tgggctgtta tgcctgtgcc ggctgctgaa agggagttca gaggtggagc      60
tcaaggagct ctgcaggcat tttgccaanc ctctccanag canagggagc aacctacact     120
ccccgctaga aagacaccag attggagtcc tgggaggggg agttggggtg ggcatttgat     180
gtatacttgt cacctgaatg aangagccag agaggaanga gacgaanatg anattggcct     240
tcaaagctag gggtctggca ggtgga                                          266


        <210> 171
        <211> 1248
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(1248)
        <223> n = A,T,C or G

        <400> 171
ggcagccaaa tcataaacgg cgaggactgc agcccgcact cgcagccctg gcaggcggca      60
ctggtcatgg aaaacgaatt gttctgctcg ggcgtcctgg tgcatccgca gtgggtgctg     120
tcagccgcac actgtttcca gaagtgagtg cagagctcct acaccatcgg gctgggcctg     180
cacagtcttg aggccgacca agagccaggg agccagatgg tggaggccag cctctccgta     240
cggcacccag agtacaacag acccttgctc gctaacgacc tcatgctcat caagttggac     300
gaatccgtgt ccgagtctga caccatccgg agcatcagca ttgcttcgca gtgccctacc     360
gcggggaact cttgcctcgt ttctggctgg ggtctgctgg cgaacggcag aatgcctacc     420
gtgctgcagt gcgtgaacgt gtcggtggtg tctgaggagg tctgcagtaa gctctatgac     480
ccgctgtacc accccagcat gttctgcgcc ggcggagggc aagaccagaa ggactcctgc     540
aacggtgact ctggggggcc cctgatctgc aacgggtact gcagggcct tgtgtctttc     600
ggaaaagccc cgtgtggcca agttggcgtg ccaggtgtct acaccaacct ctgcaaattc     660
actgagtgga tagagaaaac cgtccaggcc agttaactct gggggactggg aacccatgaa     720
attgaccccc aaatacatcc tgcggaagga attcaggaat atctgttccc agcccctcct     780
ccctcaggcc caggagtcca ggcccccagc ccctcctccc tcaaaccaag ggtacagatc     840
cccagcccct cctccctcag acccaggagt ccagaccccc cagcccctcc tccctcagac     900
ccaggagtcc agcccctcct ccctcagacc caggagtcca gaccccccag ccctcctcc     960
ctcagaccca ggggtccagg cccccaaccc ctcctccctc agactcagag gtccaagccc    1020
ccaacccntc attccccaga cccagaggtc caggtcccag ccctcntcc ctcagaccca    1080
gcggtccaat gccacctaga ctntccctgt acacagtgcc cccttgtggc acgttgaccc    1140
aaccttacca gttggttttt catttttngt ccctttcccc tagatccaga aataaagttt    1200
aagagaagng caaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaa                   1248

        <210> 172
        <211> 159
        <212> PRT
        <213> Homo sapien

        <220>
        <221> VARIANT
        <222> (1)...(159)
        <223> Xaa = Any Amino Acid

        <400> 172
Met Val Glu Ala Ser Leu Ser Val Arg His Pro Glu Tyr Asn Arg Pro
1               5                   10                  15
Leu Leu Ala Asn Asp Leu Met Leu Ile Lys Leu Asp Glu Ser Val Ser
             20                  25                  30
Glu Ser Asp Thr Ile Arg Ser Ile Ser Ile Ala Ser Gln Cys Pro Thr
          35                  40                  45
Ala Gly Asn Ser Cys Leu Val Ser Gly Trp Gly Leu Leu Ala Asn Gly
```

```
      50                      55                      60
Arg Met Pro Thr Val Leu Gln Cys Val Asn Val Ser Val Val Ser Glu
65                      70                      75                      80
Glu Val Cys Ser Lys Leu Tyr Asp Pro Leu Tyr His Pro Ser Met Phe
                    85                      90                      95
Cys Ala Gly Gly Gly Gln Xaa Gln Xaa Asp Ser Cys Asn Gly Asp Ser
                100                     105                     110
Gly Gly Pro Leu Ile Cys Asn Gly Tyr Leu Gln Gly Leu Val Ser Phe
            115                     120                     125
Gly Lys Ala Pro Cys Gly Gln Val Gly Val Pro Gly Val Tyr Thr Asn
        130                     135                     140
Leu Cys Lys Phe Thr Glu Trp Ile Glu Lys Thr Val Gln Ala Ser
145                     150                     155
```

```
        <210> 173
        <211> 1265
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(1265)
        <223> n = A,T,C or G

        <400> 173
ggcagcccgc actcgcagcc ctggcaggcg gcactggtca tggaaaacga attgttctgc     60
tcgggcgtcc tggtgcatcc gcagtgggtg ctgtcagccg cacactgttt ccagaactcc    120
tacaccatcg ggctgggcct gcacagtctt gaggccgacc aagagccagg gagccagatg    180
gtggaggcca gcctctccgt acggcaccca gagtacaaca gacccttgct cgctaacgac    240
ctcatgctca tcaagttgga cgaatccgtg tccgagtctg acaccatccg gagcatcagc    300
attgcttcgc agtgccctac cgcggggaac tcttgcctcg tttctggctg gggtctgctg    360
gcgaacggtg agctcacggg tgtgtgtctg ccctcttcaa ggaggtcctc tgcccagtcg    420
cggggctga cccagagctc tgcgtcccag gcagaatgcc taccgtgctg cagtgcgtga     480
acgtgtcggt ggtgtctgag gaggtctgca gtaagctcta tgacccgctg taccacccca    540
gcatgttctg cgccggcgga gggcaagacc agaaggactc ctgcaacggt gactctgggg    600
ggcccctgat ctgcaacggg tacttgcagg gccttgtgtc tttcggaaaa gccccgtgtg    660
gccaagttgg cgtgccaggt gtctacacca acctctgcaa attcactgag tggatagaga    720
aaaccgtcca ggccagttaa ctctggggac tgggaaccca tgaaattgac ccccaaatac    780
atcctgcgga aggaattcag gaatatctgt tcccagcccc tcctccctca ggcccaggag    840
tccaggcccc cagcccctcc tccctcaaac caagggtaca gatccccagc ccctcctccc    900
tcagacccag gagtccagac ccccagccc ctcctccctc agacccagga gtccagcccc     960
tcctccntca gacccaggag tccagacccc ccagcccctc ctccctcaga cccagggtt    1020
gaggcccca acccctcctc cttcagagtc agaggtccaa gcccccaacc cctcgttccc    1080
cagacccaga ggtnnaggtc ccagcccctc ttccntcaga cccagnggtc caatgccacc    1140
tagattttcc ctgnacacag tgcccccttg tggnangttg acccaacctt accagttggt    1200
ttttcatttt tngtcccttt ccctagatc cagaaataaa gtttaagaga ngngcaaaaa    1260
aaaaa                                                               1265


        <210> 174
        <211> 1459
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(1459)
        <223> n = A,T,C or G

        <400> 174
ggtcagccgc acactgtttc cagaagtgag tgcagagctc ctacaccatc gggctgggcc     60
tgcacagtct tgaggccgac caagagccag ggagccagat ggtggaggcc agcctctccg    120
tacggcaccc agagtacaac agacccttgc tcgctaacga cctcatgctc atcaagttgg    180
```

```
acgaatccgt gtccgagtct gacaccatcc ggagcatcag cattgcttcg cagtgcccta    240
ccgcgggggaa ctcttgcctc gtttctggct ggggtctgct ggcgaacggt gagctcacgg    300
gtgtgtgtct gccctcttca aggaggtcct ctgcccagtc gcgggggctg acccagagct    360
ctgcgtccca ggcagaatgc ctaccgtgct gcagtgcgtg aacgtgtcgg tggtgtctga    420
ngaggtctgc antaagctct atgaccgct gtaccacccc ancatgttct gcgccggcgg    480
agggcaagac cagaaggact cctgcaacgt gagagagggg aaaggggagg gcaggcgact    540
cagggaaggg tggagaaggg ggagacagag acacacaggg ccgcatggcg agatgcagag    600
atggagagac acacagggag acagtgacaa ctagagagag aaactgagag aaacagagaa    660
ataaacacag gaataaagag aagcaaagga agagagaaac agaaacagac atggggaggc    720
agaaacacac acacatagaa atgcagttga ccttccaaca gcatgggggcc tgagggcggt    780
gacctccacc caatagaaaa tcctcttata acttttgact ccccaaaaac ctgactagaa    840
atagcctact gttgacgggg agccttacca ataacataaa tagtcgattt atgcatacgt    900
tttatgcatt catgatatac ctttgttgga attttttgat atttctaagc tacacagttc    960
gtctgtgaat ttttttaaat tgttgcaact ctcctaaaat ttttctgatg tgtttattga   1020
aaaaatccaa gtataagtgg acttgtgcat tcaaaccagg gttgttcaag ggtcaactgt   1080
gtacccagag ggaaacagtg acacagattc atagaggtga aacacgaaga gaaacaggaa   1140
aaatcaagac tctacaaaga ggctgggcag ggtggctcat gcctgtaatc ccagcacttt   1200
gggaggcgag gcaggcagat cacttgaggt aaggagttca agaccagcct ggccaaaatg   1260
gtgaaatcct gtctgtacta aaaatacaaa agttagctgg atatggtggc aggcgcctgt   1320
aatcccagct acttgggagg ctgaggcagg agaattgctt gaatatggga ggcagaggtt   1380
gaagtgagtt gagatcacac cactatactc cagctggggc aacagagtaa gactctgtct   1440
caaaaaaaaa aaaaaaaaa                                                 1459
```

        <210> 175
        <211> 1167
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(1167)
        <223> n = A,T,C or G

        <400> 175

```
gcgcagccct ggcaggcggc actggtcatg gaaaacgaat tgttctgctc gggcgtcctg     60
gtgcatccgc agtgggtgct gtcagccgca cactgtttcc agaactccta caccatcggg    120
ctgggcctgc acagtcttga ggccgaccaa gagccaggga gccagatggt ggaggccagc    180
ctctccgtac ggcacccaga gtacaacaga ctcttgctcg ctaacgacct catgctcatc    240
aagttggacg aatccgtgtc cgagtctgac accatccgga gcatcagcat tgcttcgcag    300
tgccctaccg cggggaactc ttgcctcgtn tctggctggg gtctgctggc gaacggcaga    360
atgcctaccg tgctgcactg cgtgaacgtg tcggtggtgt ctgaggangt ctgcagtaag    420
ctctatgacc cgctgtacca ccccagcatg ttctgcgccg gcggagggca agaccagaag    480
gactcctgca cggtgactc tggggggccc ctgatctgca cgggtactt gcagggcctt    540
gtgtctttcg gaaaagcccc gtgtggccaa cttggcgtgc caggtgtcta caccaacctc    600
tgcaaattca ctgagtggat agagaaaacc gtccagncca gttaactctg gggactggga    660
acccatgaaa ttgacccca aatacatcct gcggaangaa ttcaggaata tctgttccca    720
gccctcctc cctcaggccc aggagtccag gcccccagcc cctcctccct caaaccaagg    780
gtacagatcc ccagcccctc ctccctcaga cccaggagtc cagacccccc agcccctcnt    840
ccntcagacc caggagtcca gcccctcctc cntcagacgc aggagtccag accccccagc    900
ccntcntccg tcagacccag gggtgcaggc ccccaacccc tcntcntca gagtcagagg    960
tccaagcccc caaccctcg ttccccagac ccagaggtnc aggtcccagc ccctcctccc   1020
tcagacccag cggtccaatg ccacctagan tntccctgta cacagtgccc ccttgtggca   1080
ngttgaccca accttaccag ttggttttc attttttgtc cctttcccct agatccagaa   1140
ataaagtnta agagaagcgc aaaaaaa                                       1167
```

        <210> 176
        <211> 205
        <212> PRT
        <213> Homo sapien

        <220>
        <221> VARIANT

```
      <222> (1)...(205)
      <223> Xaa = Any Amino Acid

         <400> 176
Met Glu Asn Glu Leu Phe Cys Ser Gly Val Leu Val His Pro Gln Trp
 1               5                  10                  15
Val Leu Ser Ala Ala His Cys Phe Gln Asn Ser Tyr Thr Ile Gly Leu
            20        .         25                  30
Gly Leu His Ser Leu Glu Ala Asp Gln Glu Pro Gly Ser Gln Met Val
        35                  40                  45
Glu Ala Ser Leu Ser Val Arg His Pro Glu Tyr Asn Arg Leu Leu Leu
    50                  55                  60            .
Ala Asn Asp Leu Met Leu Ile Lys Leu Asp Glu Ser Val Ser Glu Ser
65                  70                  75                  80
Asp Thr Ile Arg Ser Ile Ser Ile Ala Ser Gln Cys Pro Thr Ala Gly
                85                  90                  95
Asn Ser Cys Leu Val Ser Gly Trp Gly Leu Leu Ala Asn Gly Arg Met
            100                 105                 110
Pro Thr Val Leu His Cys Val Asn Val Ser Val Val Ser Glu Xaa Val
            115                 120                 125
Cys Ser Lys Leu Tyr Asp Pro Leu Tyr His Pro Ser Met Phe Cys Ala
    130                 135                 140
Gly Gly Gly Gln Asp Gln Lys Asp Ser Cys Asn Gly Asp Ser Gly Gly
145                 150                 155                 160
Pro Leu Ile Cys Asn Gly Tyr Leu Gln Gly Leu Val Ser Phe Gly Lys
                165                 170                 175
Ala Pro Cys Gly Gln Leu Gly Val Pro Gly Val Tyr Thr Asn Leu Cys
            180                 185                 190
Lys Phe Thr Glu Trp Ile Glu Lys Thr Val Gln Xaa Ser  .
        195                 200                 205    .

      <210> 177
      <211> 1119
      <212> DNA
      <213> Homo sapien

         <400> 177
gcgcactcgc agccctggca ggcggcactg gtcatggaaa acgaattgtt ctgctcgggc        60
gtcctggtgc atccgcagtg ggtgctgtca gccgcacact gtttccagaa ctcctacacc       120
atcgggctgg gcctgcacag tcttgaggcc gaccaagagc cagggagcca gatggtggag       180
gccagcctct ccgtacggca cccagagtac aacagaccct tgctcgctaa cgacctcatg       240
ctcatcaagt tggacgaatc cgtgtccgag tctgacacca tccggagcat cagcattgct       300
tcgcagtgcc ctaccgcggg gaactcttgc ctcgtttctg gctggggtct gctggcgaac       360
gatgctgtga ttgccatcca gtcccagact gtgggaggct gggagtgtga gaagctttcc       420
caaccctggc agggttgtac catttcggca acttccagtg caaggacgtc ctgctgcatc       480
ctcactgggt gctcactact gctcactgca tcacccggaa cactgtgatc aactagccag       540
caccatagtt ctccgaagtc agactatcat gattactgtg ttgactgtgc tgtctattgt       600
actaaccatg ccgatgttta ggtgaaatta gcgtcacttg gcctcaacca tcttggtatc       660
cagttatcct cactgaattg agatttcctg cttcagtgtc agccattccc acataatttc       720
tgacctacag aggtgaggga tcatatagct cttcaaggat gctggtactc ccctcacaaa       780
ttcatttctc ctgttgtagt gaaaggtgcg ccctctggag cctcccaggg tgggtgtgca       840
ggtcacaatg atgaatgtat gatcgtgttc ccattaccca aagcctttaa atccctcatg       900
ctcagtacac cagggcaggt ctagcatttc ttcatttagt gtatgctgtc cattcatgca       960
accacctcag gactcctgga ttctctgcct agttgagctc ctgcatgctg cctccttggg      1020
gaggtgaggg agagggccca tggttcaatg ggatctgtgc agttgtaaca cattaggtgc      1080
ttaataaaca gaagctgtga tgttaaaaaa aaaaaaaaa                             1119

      <210> 178
      <211> 164
      <212> PRT
      <213> Homo sapien
```

59

```
        <220>
        <221> VARIANT
        <222> (1)...(164)
        <223> Xaa = Any Amino Acid

        <400> 178
Met Glu Asn Glu Leu Phe Cys Ser Gly Val Leu Val His Pro Gln Trp
 1               5                   10                  15
Val Leu Ser Ala Ala His Cys Phe Gln Asn Ser Tyr Thr Ile Gly Leu
            20                  25                  30
Gly Leu His Ser Leu Glu Ala Asp Gln Glu Pro Gly Ser Gln Met Val
        35                  40                  45
Glu Ala Ser Leu Ser Val Arg His Pro Glu Tyr Asn Arg Pro Leu Leu
    50                  55                  60
Ala Asn Asp Leu Met Leu Ile Lys Leu Asp Glu Ser Val Ser Glu Ser
65                  70                  75                  80
Asp Thr Ile Arg Ser Ile Ser Ile Ala Ser Gln Cys Pro Thr Ala Gly
            85                  90                  95
Asn Ser Cys Leu Val Ser Gly Trp Gly Leu Leu Ala Asn Asp Ala Val
            100                 105                 110
Ile Ala Ile Gln Ser Xaa Thr Val Gly Gly Trp Glu Cys Glu Lys Leu
        115                 120                 125
Ser Gln Pro Trp Gln Gly Cys Thr Ile Ser Ala Thr Ser Ser Ala Arg
    130                 135                 140
Thr Ser Cys Cys Ile Leu Thr Gly Cys Ser Leu Leu Leu Thr Ala Ser
145                 150                 155                 160
Pro Gly Thr Leu
```

```
        <210> 179
        <211> 250
        <212> DNA
        <213> Homo sapien

        <400> 179
ctggagtgcc ttggtgtttc aagcccctgc aggaagcaga atgcaccttc tgaggcacct    60
ccagctgccc ccggccgggg gatgcgaggc tcggagcacc cttgcccggc tgtgattgct   120
gccaggcact gttcatctca gcttttctgt ccctttgctc ccggcaagcg cttctgctga   180
aagttcatat ctggagcctg atgtcttaac gaataaaggt cccatgctcc acccgaaaaa   240
aaaaaaaaaa                                                          250
```

```
        <210> 180
        <211> 202
        <212> DNA
        <213> Homo sapien.

        <400> 180
actagtccag tgtggtggaa ttccattgtg ttgggcccaa cacaatggct acctttaaca    60
tcacccagac cccgcccctg cccgtgcccc acgctgctgc taacgacagt atgatgctta   120
ctctgctact cggaaactat ttttatgtaa ttaatgtatg ctttcttgtt tataaatgcc   180
tgatttaaaa aaaaaaaaaa aa                                            202
```

```
        <210> 181
        <211> 558
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(558)
        <223> n = A,T,C or G
```

```
        <400> 181
tccytttgkt naggtttkkg agacamccck agacctwaan ctgtgtcaca gacttcyngg      60
aatgtttagg cagtgctagt aatttcytcg taatgattct gttattactt tcctnattct     120
ttattcctct ttcttctgaa gattaatgaa gttgaaaatt gaggtggata aatacaaaaa     180
ggtagtgtga tagtataagt atctaagtgc agatgaaagt gtgttatata tatccattca     240
aaattatgca agttagtaat tactcagggt taactaaatt actttaatat gctgttgaac     300
ctactctgtt ccttggctag aaaaaattat aaacaggact ttgttagttt gggaagccaa     360
attgataata ttctatgttc taaaagttgg gctatacata aattattaag aaatatggaw     420
ttttattccc aggaatatgg kgttcatttt atgaatatta cscrggatag awgtwtgagt     480
aaaaycagtt ttggtwaata ygtwaatatg tcmtaaataa acaakgcttt gacttatttc     540
caaaaaaaaa aaaaaaaa                                                   558
```

```
        <210> 182
        <211> 479
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(479)
        <223> n = A,T,C or G


        <400> 182
acagggwttk grggatgcta agsccccrga rwtygtttga tccaaccctg gcttwttttc      60
agaggggaaa atggggccta gaagttacag mscatytagy tggtgcgmtg gcacccctgg     120
cstcacacag astcccgagt agctgggact acaggcacac agtcactgaa gcaggccctg     180
ttwgcaattc acgttgccac ctccaactta aacattcttc atatgtgatg tccttagtca     240
ctaaggttaa actttcccac ccagaaaagg caacttagat aaaatcttag agtactttca     300
tactmttcta agtcctcttc cagcctcact kkgagtcctm cytgggggtt gataggaant     360
ntctcttggc tttctcaata aartctctat ycatctcatg tttaatttgg tacgcatara     420
awtgstgara aaattaaaat gttctggtty mactttaaaa araaaaaaaa aaaaaaaaa     479
```

```
        <210> 183
        <211> 384
        <212> DNA
        <213> Homo sapien


        <400> 183
aggcgggagc agaagctaaa gccaaagccc aagaagagtg gcagtgccag cactggtgcc      60
agtaccagta ccaataacag tgccagtgcc agtgccagca ccagtggtgg cttcagtgct     120
ggtgccagcc tgaccgccac tctcacattt gggctcttcg ctggccttgg tggagctggt     180
gccagcacca gtggcagctc tggtgcctgt ggtttctcct acaagtgaga ttttagatat     240
tgttaatcct gccagtcttt ctcttcaagc cagggtgcat cctcagaaac ctactcaaca     300
cagcactcta ggcagccact atcaatcaat tgaagttgac actctgcatt aratctattt     360
gccatttcaa aaaaaaaaaa aaaa                                           384
```

```
        <210> 184
        <211> 496
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(496)
        <223> n = A,T,C or G


        <400> 184
accgaattgg gaccgctggc ttataagcga tcatgtyynt ccrgtatkac ctcaacgagc      60
agggagatcg agtctatacg ctgaagaaat ttgacccgat gggacaacag acctgctcag     120
cccatcctgc tcggttctcc ccagatgaca aatactctsg acaccgaatc accatcaaga     180
aacgcttcaa ggtgctcatg acccagcaac cgcgccctgt cctctgaggg tcccttaaac     240
tgatgtcttt tctgccacct gttacccctc ggagactccg taaccaaact cttcggactg     300
```

```
tgagccctga tgccttttttg ccagccatac tctttggcat ccagtctctc gtggcgattg    360
attatgcttg tgtgaggcaa tcatggtggc atcacccata aagggaacac atttgacttt    420
tttttctcat attttaaatt actacmagaw tattwmagaw waaatgawtt gaaaaactst    480
taaaaaaaaa aaaaa                                                     496
```

```
        <210> 185
        <211> 384
        <212> DNA
        <213> Homo sapien

        <400> 185
gctggtagcc tatggcgkgg cccacggagg ggctcctgag gccacggrac agtgacttcc     60
caagtatcyt gcgcsgcgtc ttctaccgtc cctacctgca gatcttcggg cagattcccc    120
aggaggacat ggacgtggcc ctcatggagc acagcaactg ytcgtcggag cccggcttct    180
gggcacaccc tcctggggcc caggcgggca cctgcgtctc ccagtatgcc aactggctgg    240
tggtgctgct cctcgtcatc ttcctgctcg tggccaacat cctgctggtc aacttgctca    300
ttgccatgtt cagttacaca ttcggcaaag tacagggcaa cagcgatctc tactgggaag    360
gcgcagcgtt accgcctcat ccgg                                          384
```

```
        <210> 186
        <211> 577
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(577)
        <223> n = A,T,C or G

        <400> 186
gagttagctc ctccacaacc ttgatgaggt cgtctgcagt ggcctctcgc ttcataccgc     60
tnccatcgtc atactgtagg tttgccacca cytcctggca tcttgggggcg gcntaatatt    120
ccaggaaact ctcaatcaag tcaccgtcga tgaaacctgt gggctggttc tgtcttccgc    180
tcggtgtgaa aggatctccc agaaggagtg ctcgatcttc cccacacttt tgatgacttt    240
attgagtcga ttctgcatgt ccagcaggag gttgtaccag ctctctgaca gtgaggtcac    300
cagccctatc atgccgttga mcgtgccgaa garcaccgag ccttgtgtgg gggkkgaagt    360
ctcacccaga ttctgcatta ccagagagcc gtggcaaaag acattgacaa actcgcccag    420
gtggaaaaag amcamctcct ggargtgctn gccgctcctc gtcmgttggt ggcagcgctw    480
tcctttttgac acacaaacaa gttaaaggca ttttcagccc ccagaaantt gtcatcatcc    540
aagatntcgc acagcactna tccagttggg attaaat                            577
```

```
        <210> 187
        <211> 534
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(534)
        <223> n = A,T,C or G

        <400> 187
aacatcttcc tgtataatgc tgtgtaatat cgatccgatn ttgtctgstg agaatycatw     60
actkggaaaa gmaacattaa agcctggaca ctggtattaa aattcacaat atgcaacact    120
ttaaacagtg tgtcaatctg ctcccyynac tttgtcatca ccagtctggg aakaagggta    180
tgccctattc acacctgtta aaagggcgct aagcattttt gattcaacat cttttttttt    240
gacacaagtc cgaaaaaagc aaaagtaaac agttatyaat ttgttagcra attcactttc    300
ttcatgggac agagccatyt gatttaaaaa gcaaattgca taatattgag cttyggggagc    360
tgatatttga gcggaagagt agcctttcta cttcaccaga cacaactccc tttcatattg    420
ggatgttnac naaagtwatg tctctwacag atgggatgct tttgtggcaa ttctgttctg    480
aggatctccc agtttattta ccacttgcac aagaaggcgt tttcttcctc aggc         534
```

62

```
<210> 188
<211> 761
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(761)
<223> n = A,T,C or G

<400> 188
agaaaccagt atctctnaaa acaacctctc ataccttgtg gacctaattt tgtgtgcgtg      60
tgtgtgtgcg cgcatattat atagacaggc acatcttttt tactttgta aaagcttatg     120
cctctttggt atctatatct gtgaaagttt taatgatctg ccataatgtc ttgggggacct     180
ttgtcttctg tgtaaatggt actagagaaa acacctatnt tatgagtcaa tctagttngt     240
tttattcgac atgaaggaaa tttccagatn acaacactna caaactctcc ctkgackarg     300
ggggacaaag aaaagcaaaa ctgamcataa raaacaatwa cctggtgaga arttgcataa     360
acagaaatwr ggtagtatat tgaarnacag catcattaaa rmgttwtktt wttctccctt     420
gcaaaaaaca tgtacngact tcccgttgag taatgccaag ttgttttttt tatnataaaa     480
cttgcccttc attacatgtt tnaaagtggt gtggtgggcc aaaatattga aatgatggaa     540
ctgactgata aagctgtaca aataagcagt gtgcctaaca agcaacacag taatgttgac     600
atgcttaatt cacaaatgct aatttcatta taaatgtttg ctaaaataca ctttgaacta     660
tttttctgtn ttcccagagc tgagatntta gattttatgt agtatnaagt gaaaaantac     720
gaaaataata acattgaaga aaaananaaa aaanaaaaaa a                         761

<210> 189
<211> 482
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(482)
<223> n = A,T,C or G

<400> 189
ttttttttt tttgccgatn ctactatttt attgcaggan gtgggggtgt atgcaccgca      60
caccggggct atnagaagca agaaggaagg agggagggca cagcccttg ctgagcaaca     120
aagccgcctg ctgccttctc tgtctgtctc ctggtgcagg cacatgggga gaccttcccc     180
aaggcagggg ccaccagtcc aggggtggga atacaggggg tgggangtgt gcataagaag     240
tgataggcac aggccacccg gtacagaccc ctcggctcct gacaggtnga tttcgaccag     300
gtcattgtgc cctgcccagg cacagcgtan atctggaaaa gacagaatgc tttcctttc      360
aaatttggct ngtcatngaa ngggcanttt tccaanttng gctnggtctt ggtacncttg     420
gttcggccca gctccncgtc caaaaantat tcacccnnct ccnaattgct tgcnggnccc     480
cc                                                                    482

<210> 190
<211> 471
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(471)
<223> n = A,T,C or G

<400> 190
ttttttttt ttttaaaaca gtttttcaca acaaaattta ttagaagaat agtggttttg      60
aaaactctcg catccagtga gaactaccat acaccacatt acagctngga atgtnctcca     120
aatgtctggt caaatgatac aatggaacca ttcaatctta cacatgcacg aaagaacaag     180
cgcttttgac atacaatgca caaaaaaaaa agggggggggg gaccacatgg attaaaattt     240
taagtactca tcacatacat taagacacag ttctagtcca gtcnaaaatc agaactgcnt     300
```

63

```
tgaaaaattt catgtatgca atccaaccaa agaacttnat tggtgatcat gantnct'cta      360
ctacatcnac cttgatcatt gccaggaacn aaaagttnaa ancacncngt acaaaaanaa      420
tctgtaattn anttcaacct ccgtacngaa aaatnttnnt tatacactcc c               471
```

```
        <210> 191
        <211> 402
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(402)
        <223> n = A,T,C or G

        <400> 191
gagggattga aggtctgttc tastgtcggm ctgttcagcc accaactcta acaagttgct       60
gtcttccact cactgtctgt aagctttta acccagacwg tatcttcata aatagaacaa       120
attcttcacc agtcacatct tctaggacct ttttggattc agttagtata agctcttcca      180
cttcctttgt taagacttca tctggtaaag tcttaagttt tgtagaaagg aattyaattg      240
ctcgttctct aacaatgtcc tctccttgaa gtatttggct gaacaaccca cctaaagtcc      300
ctttgtgcat ccattttaaa tatacttaat agggcattgk tncactaggt taaattctgc      360
aagagtcatc tgtctgcaaa agttgcgtta gtatatctgc ca                        402
```

```
        <210> 192
        <211> 601
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(601)
        <223> n = A,T,C or G

        <400> 192
gagctcggat ccaataatct ttgtctgagg gcagcacaca tatncagtgc catggnaact       60
ggtctacccc acatgggagc agcatgccgt agntatataa ggtcattccc tgagtcagac      120
atgcytyttt gaytaccgtg tgccaagtgc tggtgattct yaacacacyt ccatcccgyt      180
cttttgtgga aaaactggca cttktctgga actagcarga catcacttac aaattcaccc      240
acgagacact tgaaaggtgt aacaaagcga ytcttgcatt gcttttttgtc cctccggcac      300
cagttgtcaa tactaacccg ctggtttgcc tccatcacat ttgtgatctg tagctctgga      360
tacatctcct gacagtactg aagaacttct tcttttgttt caaaagcarc tcttggtgcc      420
tgttggatca ggttcccatt tcccagtcyg aatgttcaca tggcatattt wacttcccac      480
aaaacattgc gatttgaggc tcagcaacag caaatcctgt tccggcattg gctgcaagag      540
cctcgatgta gccggccagc gccaaggcag gcgccgtgag ccccaccagc agcagaagca      600
g                                                                     601
```

```
        <210> 193
        <211> 608
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(608)
        <223> n = A,T,C or G

        <400> 193
atacagccca natcccacca cgaagatgcg cttgttgact gagaacctga tgcggtcact       60
ggtcccgctg tagcccccagc gactctccac ctgctggaag cggttgatgc tgcactcytt      120
cccaacgcag gcagmagcgg gsccggtcaa tgaactccay tcgtggcttg gggtkgacgg      180
tkaagtgcag gaagaggctg accacctcgc ggtccaccag gatgcccgac tgtgcgggac      240
ctgcagcgaa actcctcgat ggtcatgagc gggaagcgaa tgaggcccag ggccttgccc      300
```

64

```
agaaccttcc gcctgttctc tggcgtcacc tgcagctgct gccgctgaca ctcggcctcg      360
gaccagcgga caaacggcrt tgaacagccg cacctcacgg atgcccagtg tgtcgcgctc      420
caggammgsc accagcgtgt ccaggtcaat gtcggtgaag ccctccgcgg gtratggcgt      480
ctgcagtgtt tttgtcgatg ttctccaggc acaggctggc cagctgcggt tcatcgaaga      540
gtcgcgcctg cgtgagcagc atgaaggcgt tgtcggctcg cagttcttct tcaggaactc      600
cacgcaat                                                               608
```

```
        <210> 194
        <211> 392
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(392)
        <223> n = A,T,C or G

        <400> 194
gaacggctgg accttgcctc gcattgtgct tgctggcagg gaataccttg gcaagcagyt      60
ccagtccgag cagccccaga ccgctgccgc ccgaagctaa gcctgcctct ggccttcccc      120
tccgcctcaa tgcagaacca gtagtgggag cactgtgttt agagttaaga gtgaacactg      180
tttgatttta cttgggaatt tcctctgtta tatagctttt cccaatgcta atttccaaac      240
aacaacaaca aaataacatg tttgcctgtt aagttgtata aaagtaggtg attctgtatt      300
taaagaaaat attactgtta catatactgc ttgcaatttc tgtatttatt gktnctstgg      360
aaataaatat agttattaaa ggttgtcant cc                                    392
```

```
        <210> 195
        <211> 502
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(502)
        <223> n = A,T,C or G

        <400> 195
ccsttkgagg ggtkaggkyc cagttyccga gtggaagaaa caggccagga gaagtgcgtg      60
ccgagctgag gcagatgttc ccacagtgac ccccagagcc stgggstata gtytctgacc      120
cctcncaagg aaagaccacs ttctggggac atgggctgga gggcaggacc tagaggcacc      180
aagggaaggc cccattccgg ggstgttccc cgaggaggaa gggaaggggc tctgtgtgcc      240
ccccasgagg aagaggccct gagtcctggg atcagacacc ccttcacgtg tatccccaca      300
caaatgcaag ctcaccaagg tcccctctca gtcccttcc stacaccctg amcggccact      360
gscscacacc cacccagagc acgccacccg ccatggggar tgtgctcaag gartcgcngg      420
gcarcgtgga catctngtcc cagaaggggg cagaatctcc aatagangga ctgarcmstt      480
gctnanaaaa aaaaanaaaa aa                                               502
```

```
        <210> 196
        <211> 665
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(665)
        <223> n = A,T,C or G

        <400> 196
ggttacttgg tttcattgcc accacttagt ggatgtcatt tagaaccatt ttgtctgctc      60
cctctggaag ccttgcgcag agcggacttt gtaattgttg gagaataact gctgaatttt      120
wagctgtttk gagttgatts gcaccactgc acccacaact tcaatatgaa aacyawttga      180
actwatttat tatcttgtga aaagtataac aatgaaaatt ttgttcatac tgtattkatc      240
```

```
aagtatgatg aaaagcaawa gatatatatt cttttattat gttaaattat gattgccatt        300
attaatcggc aaaatgtgga gtgtatgttc ttttcacagt aatatatgcc ttttgtaact        360
tcacttggtt attttattgt aaatgartta caaaattctt aatttaagar aatggtatgt        420
watatttatt tcattaattt ctttcctkgt ttacgtwaat tttgaaaaga wtgcatgatt        480
tcttgacaga aatcgatctt gatgctgtgg aagtagtttg acccacatcc ctatgagttt        540
ttcttagaat gtataaaggt tgtagcccat cnaacttcaa agaaaaaaat gaccacatac        600
tttgcaatca ggctgaaatg tggcatgctn ttctaattcc aactttataa actagcaaan        660
aagtg                                                                    665
```

```
        <210> 197
        <211> 492
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(492)
        <223> n = A,T,C or G

        <400> 197
tttttnttttt ttttttttgc aggaaggatt ccatttattg tggatgcatt ttcacaatat        60
atgtttattg gagcgatcca ttatcagtga aaagtatcaa gtgtttataa nattttttagg       120
aaggcagatt cacagaacat gctngtcngc ttgcagtttt acctcgtana gatnacagag        180
aattatagtc naaccagtaa acnaggaatt tacttttcaa aagattaaat ccaaactgaa        240
caaaattcta ccctgaaact tactccatcc aaatattgga ataanagtca gcagtgatac        300
attctcttct gaactttaga ttttctagaa aaatatgtaa tagtgatcag gaagagctct        360
tgttcaaaag tacaacnaag caatgttccc ttaccatagg ccttaattca aactttgatc        420
catttcactc ccatcacggg agtcaatgct acctgggaca cttgtatttt gttcatnctg        480
ancntggctt aa                                                            492
```

```
        <210> 198
        <211> 478
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(478)
        <223> n = A,T,C or G

        <400> 198
tttnttttgn atttcantct gtannaanta ttttcattat gtttattana aaaatatnaa        60
tgtntccacn acaaatcatn ttacntnagt aagaggccan ctacattgta caacatacac       120
tgagtatatt ttgaaaagga caagtttaaa gtanacncat attgccganc atancacatt       180
tatacatggc ttgattgata tttagcacag canaaactga gtgagttacc agaaanaaat       240
natatatgtc aatcngattt aagatacaaa acagatccta tggtacatan catcntgtag       300
gagttgtggc tttatgttta ctgaaagtca atgcagttcc tgtacaaaga gatggccgta       360
agcattctag tacctctact ccatggttaa gaatcgtaca cttatgttta catatgtnca       420
gggtaagaat tgtgttaagt naanttatgg agaggtccan gagaaaaatt tgatncaa        478
```

```
        <210> 199
        <211> 482
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(482)
        <223> n = A,T,C or G

        <400> 199
agtgacttgt cctccaacaa aaccccttga tcaagtttgt ggcactgaca atcagaccta        60
```

```
tgctagttcc tgtcatctat tcgctactaa atgcagactg gaggggacca aaaaggggca    120
tcaactccag ctggattatt ttggagcctg caaatctatt cctacttgta cggactttga    180
agtgattcag tttcctctac ggatgagaga ctggctcaag aatatcctca tgcagcttta    240
tgaagccnac tctgaacacg ctggttatct nagatgagaa ncagagaaat aaagtcnaga    300
aaatttacct ggangaaaag aggctttngg ctggggacca tcccattgaa ccttctctta    360
anggacttta agaanaaact accacatgtn tgtngtatcc tggtgccngg ccgtttantg    420
aacntngacn ncacccttnt ggaatanant cttgacngcn tcctgaactt gctcctctgc    480
ga                                                                  482
```

        <210> 200
        <211> 270
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(270)
        <223> n = A,T,C or G

        <400> 200
```
cggccgcaag tgcaactcca gctggggccg tgcggacgaa gattctgcca gcagttggtc     60
cgactgcgac gacggcggcg gcgacagtcg caggtgcagc gcgggcgcct ggggtcttgc    120
aaggctgagc tgacgccgca gaggtcgtgt cacgtcccac gaccttgacg ccgtcgggga    180
cagccggaac agagcccggt gaangcggga ggcctcgggg agccctcgg gaagggcggc    240
ccgagagata cgcaggtgca ggtggccgcc                                    270
```

        <210> 201
        <211> 419
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(419)
        <223> n = A,T,C or G

        <400> 201
```
tttttttttt ttttggaatc tactgcgagc acagcaggtc agcaacaagt ttattttgca     60
gctagcaagg taacagggta gggcatggtt acatgttcag gtcaacttcc tttgtcgtgg    120
ttgattggtt tgtctttatg ggggcgggt ggggtagggg aaancgaagc anaantaaca    180
tggagtgggt gcaccctccc tgtagaacct ggttacnaaa gcttgggca gttcacctgg    240
tctgtgaccg tcattttctt gacatcaatg ttattagaag tcaggatatc ttttagagag    300
tccactgtnt ctggagggag attagggttt cttgccaana tccaancaaa atccacntga    360
aaaagttgga tgatncangt acngaatacc ganggcatan ttctcatant cggtggcca    419
```

        <210> 202
        <211> 509
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(509)
        <223> n = A,T,C or G

        <400> 202
```
tttntttttt tttttttttt tttttttttt tttttttttt tttttttttt tttttttttt     60
tggcacttaa tccattttta tttcaaaatg tctacaaant ttnaatncnc cattatacng    120
gtnattttnc aaaatctaaa nnttattcaa atntnagcca aantccttac ncaaatnnaa    180
tacncncaaa aatcaaaaat atacntntct ttcagcaaac ttngttacat aaattaaaaa    240
aatatatacg gctggtgttt tcaaagtaca attatcttaa cactgcaaac atntttnnaa    300
ggaactaaaa taaaaaaaaa cactnccgca aaggttaaag ggaacaacaa attcnttta    360
```

```
caacancnnc nattataaaa atcatatctc aaatcttagg ggaatatata cttcacacng      420
ggatcttaac ttttactnca ctttgtttat tttttttanaa ccattgtntt gggcccaaca      480
caatggnaat nccnccncnc tggactagt                                         509
```

```
        <210> 203
        <211> 583
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(583)
        <223> n = A,T,C or G

        <400> 203
tttttttttt tttttttga cccccctctt ataaaaaaca agttaccatt ttattttact       60
tacacatatt tattttataa ttggtattag atattcaaaa ggcagctttt aaaatcaaac      120
taaatggaaa ctgccttaga tacataattc ttaggaatta gcttaaaatc tgcctaaagt      180
gaaaatcttc tctagctctt ttgactgtaa attttttgact cttgtaaaac atccaaattc      240
attttttcttg tctttaaaat tatctaatct ttccattttt tccctattcc aagtcaattt      300
gcttctctag cctcatttcc tagctcttat ctactattag taagtggctt ttttcctaaa      360
agggaaaaca ggaagagana atggcacaca aaacaaacat tttatattca tatttctacc      420
tacgttaata aaatagcatt ttgtgaagcc agctcaaaag aaggcttaga tccttttatg      480
tccattttag tcactaaacg atatcnaaag tgccagaatg caaaaggttt gtgaacattt      540
attcaaaagc taatataaga tatttcacat actcatcttt ctg                        583
```

```
        <210> 204
        <211> 589
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(589)
        <223> n = A,T,C or G

        <400> 204
ttttttttnt tttttttttt tttttnctc ttcttttttt ttganaatga ggatcgagtt       60
tttcactctc tagatagggc atgaagaaaa ctcatctttc cagctttaaa ataacaatca      120
aatctcttat gctatatcat attttaagtt aaactaatga gtcactggct tatcttctcc      180
tgaaggaaat ctgttcattc ttctcattca tatagttata tcaagtacta ccttgcatat      240
tgagaggttt ttcttctcta tttacacata tatttccatg tgaatttgta tcaaaccttt      300
attttcatgc aaactagaaa ataatgtntt cttttgcata agagaagaga acaatatnag      360
cattacaaaa ctgctcaaat tgtttgttaa gnttatccat tataattagt tnggcaggag      420
ctaatacaaa tcacatttac ngacnagcaa taataaaact gaagtaccag ttaaatatcc      480
aaaataatta aaggaacatt tttagcctgg gtataattag ctaattcact ttacaagcat      540
ttattnagaa tgaattcaca tgttattatt ccntagccca acacaatgg                  589
```

```
        <210> 205
        <211> 545
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(545)
        <223> n = A,T,C or G

        <400> 205
tttttntttt tttttttcagt aataatcaga acaatattta tttttatatt taaaattcat       60
agaaaagtgc cttacattta ataaaagttt gtttctcaaa gtgatcagag gaattagata      120
tngtcttgaa caccaatatt aatttgagga aaatacacca aaatacatta agtaaattat      180
```

68

```
ttaagatcat agagcttgta agtgaaaaga taaaatttga cctcagaaac tctgagcatt    240
aaaaatccac tattagcaaa taaattacta tggacttctt gctttaattt tgtgatgaat    300
atggggtgtc actggtaaac caacacattc tgaaggatac attacttagt gatagattct    360
tatgtacttt gctanatnac gtggatatga gttgacaagt ttctctttct tcaatctttt    420
aaggggcnga ngaaatgagg aagaaaagaa aaggattacg catactgttc tttctatngg    480
aaggattaga tatgtttcct ttgccaatat taaaaaaata ataatgttta ctactagtga    540
aaccc                                                                545
```

```
        <210> 206
        <211> 487
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(487)
        <223> n = A,T,C or G

        <400> 206
tttttttttt tttttagtc aagtttctna tttttattat aattaaagtc ttggtcattt     60
catttattag ctctgcaact tacatattta aattaaagaa acgttnttag acaactgtna    120
caatttataa atgtaaggtg ccattattga gtanatatat tcctccaaga gtggatgtgt    180
cccttctccc accaactaat gaancagcaa cattagttta attttattag tagatnatac    240
actgctgcaa acgctaattc tcttctccat ccccatgtng atattgtgta tatgtgtgag    300
ttggtnagaa tgcatcanca atctnacaat caacagcaag atgaagctag gcntgggctt    360
tcggtgaaaa tagactgtgt ctgtctgaat caaatgatct gacctatcct cggtggcaag    420
aactcttcga accgcttcct caaaggcngc tgccacattt gtggcntctn ttgcacttgt    480
ttcaaaa                                                              487
```

```
        <210> 207
        <211> 332
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(332)
        <223> n = A,T,C or G

        <400> 207
tgaattggct aaaagactgc atttttanaa ctagcaactc ttatttcttt cctttaaaaa     60
tacatagcat taaatcccaa atcctattta aagacctgac agcttgagaa ggtcactact    120
gcatttatag gaccttctgg tggttctgct gttacntttg aantctgaca atccttgana    180
atctttgcat gcagaggagg taaaaggtat tggattttca cagaggaana acacagcgca    240
gaaatgaagg ggccaggctt actgagcttg tccactggag ggctcatggg tgggacatgg    300
aaaagaaggc agcctaggcc ctggggagcc ca                                  332
```

```
        <210> 208
        <211> 524
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(524)
        <223> n = A,T,C or G

        <400> 208
agggcgtggt gcggagggcg ttactgtttt gtctcagtaa caataaatac aaaaagactg     60
gttgtgttcc ggccccatcc aaccacgaag ttgatttctc ttgtgtgcag agtgactgat    120
tttaaaggac atggagcttg tcacaatgtc acaatgtcac agtgtgaagg gcacactcac    180
tcccgcgtga ttcacattta gcaaccaaca atagctcatg agtccatact tgtaaatact    240
```

69

```
tttggcagaa tacttnttga aacttgcaga.tgataactaa gatccaagat atttcccaaa      300
gtaaatagaa gtgggtcata atattaatta cctgttcaca tcagcttcca tttacaagtc      360
atgagcccag acactgacat caaactaagc ccacttagac tcctcaccac cagtctgtcc      420
tgtcatcaga caggaggctg tcaccttgac caaattctca ccagtcaatc atctatccaa      480
aaaccattac ctgatccact tccggtaatg caccaccttg gtga                      524
```

        <210> 209
        <211> 159
        <212> DNA
        <213> Homo sapien

        <400> 209
```
gggtgaggaa atccagagtt gccatggaga aaattccagt gtcagcattc ttgctccttg       60
tggccctctc ctacactctg gccagagata ccacagtcaa acctggagcc aaaaaggaca      120
caaaggactc tcgacccaaa ctgccccaga ccctctcca                            159
```

        <210> 210
        <211> 256
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(256)
        <223> n = A,T,C or G

        <400> 210
```
actccctggc agacaaaggc agaggagaga gctctgttag ttctgtgttg ttgaactgcc       60
actgaatttc tttccacttg gactattaca tgccanttga gggactaatg gaaaaacgta      120
tggggagatt ttanccaatt tangtntgta aatggggaga ctggggcagg cgggagagat      180
ttgcaggggtg naaatgggan ggctggtttg ttanatgaac aggacatag gaggtaggca      240
ccaggatgct aaatca                                                      256
```

        <210> 211
        <211> 264
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(264)
        <223> n = A,T,C or G

        <400> 211
```
acattgtttt tttgagataa agcattgaga gagctctcct taacgtgaca caatggaagg       60
actggaacac atacccacat ctttgttctg agggataatt ttctgataaa gtcttgctgt      120
atattcaagc acatatgtta tatattattc agttccatgt ttatagccta gttaaggaga      180
ggggagatac attcngaaag aggactgaaa gaaatactca agtnggaaaa cagaaaaaga      240
aaaaaggag caaatgagaa gcct                                              264
```

        <210> 212
        <211> 328
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(328)
        <223> n = A,T,C or G

        <400> 212
```
acccaaaaat ccaatgctga atatttggct tcattattcc canattcttt gattgtcaaa       60
```

70

```
ggatttaatg ttgtctcagc ttgggcactt cagttaggac ctaaggatgc cagccggcag        120
gtttatatat gcagcaacaa tattcaagcg cgacaacagg ttattgaact tgcccgccag        180
ttnaatttca ttcccattga cttgggatcc ttatcatcag ccagagagat tgaaaattta        240
cccctacnac tctttactct ctgganaggg ccagtggtgg tagctataag cttggccaca        300
ttttttttc ctttattcct ttgtcaga                                           328
```

```
        <210> 213
        <211> 250
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(250)
        <223> n = A,T,C or G

        <400> 213
acttatgagc agagcgacat atccnagtgt agactgaata aaactgaatt ctctccagtt        60
taaagcattg ctcactgaag ggatagaagt gactgccagg agggaaagta agccaaggct        120
cattatgcca aagganatat acatttcaat tctccaaact tcttcctcat tccaagagtt        180
ttcaatattt gcatgaacct gctgataanc catgttaana aacaaatatc tctctnacct        240
tctcatcggt                                                              250
```

```
        <210> 214
        <211> 444
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(444)
        <223> n = A,T,C or G

        <400> 214
acccagaatc caatgctgaa tatttggctt cattattccc agattctttg attgtcaaag        60
gatttaatgt tgtctcagct tgggcacttc agttaggacc taaggatgcc agccggcagg        120
tttatatatg cagcaacaat attcaagcgc gacaacaggt tattgaactt gcccgccagt        180
tgaatttcat tcccattgac ttgggatcct tatcatcagc canagagatt gaaaatttac        240
ccctacgact ctttactctc tggagagggc cagtggtggt agctataagc ttggccacat        300
ttttttttcc tttattcctt tgtcagagat gcgattcatc catatgctan aaaccaacag        360
agtgactttt acaaaattcc tataganatt gtgaataaaa ccttacctat agttgccatt        420
actttgctct ccctaatata cctc                                              444
```

```
        <210> 215
        <211> 366
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(366)
        <223> n = A,T,C or G

        <400> 215
acttatgagc agagcgacat atccaagtgt anactgaata aaactgaatt ctctccagtt        60
taaagcattg ctcactgaag ggatagaagt gactgccagg agggaaagta agccaaggct        120
cattatgcca aagganatat acatttcaat tctccaaact tcttcctcat tccaagagtt        180
ttcaatattt gcatgaacct gctgataagc catgttgaga aacaaatatc tctctgacct        240
tctcatcggt aagcagaggc tgtaggcaac atggaccata gcgaanaaaa aacttagtaa        300
tccaagctgt tttctacact gtaaccaggt ttccaaccaa ggtggaaatc tcctatactt        360
ggtgcc                                                                  366
```

71

```
<210> 216
<211> 260
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(260)
<223> n = A,T,C or G

<400> 216
ctgtataaac agaactccac tgcangaggg agggccgggc caggagaatc tccgcttgtc      60
caagacaggg gcctaaggag ggtctccaca ctgctnntaa gggctnttnc attttttat      120
taataaaaag tnnaaaaggc ctcttctcaa ctttttttccc ttnggctgga aaatttaaaa      180
atcaaaaatt tcctnaagtt ntcaagctat catatatact ntatcctgaa aaagcaacat      240
aattcttcct tccctccttt                                                260

<210> 217
<211> 262
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(262)
<223> n = A,T,C or G

<400> 217
acctacgtgg gtaagtttan aaatgttata atttcaggaa naggaacgca tataattgta      60
tcttgcctat aattttctat tttaataagg aaatagcaaa ttggggtggg gggaatgtag      120
ggcattctac agtttgagca aaatgcaatt aaatgtggaa ggacagcact gaaaaattt      180
atgaataatc tgtatgatta tatgtctcta gagtagattt ataattagcc acttaccctat      240
atatccttca tgcttgtaaa gt                                              262

<210> 218
<211> 205
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(205)
<223> n = A,T,C or G

<400> 218
accaaggtgg tgcattaccg gaantggatc aangacacca tcgtggccaa cccctgagca      60
ccctatcaa ctcccttttg tagtaaactt ggaaccttgg aaatgaccag gccaagactc      120
aggcctcccc agttctactg acctttgtcc ttangtntna ngtccagggt tgctaggaaa      180
anaaatcagc agacacaggt gtaaa                                          205

<210> 219
<211> 114
<212> DNA
<213> Homo sapien

<400> 219
tactgttttg tctcagtaac aataaataca aaaagactgg ttgtgttccg gccccatcca      60
accacgaagt tgatttctct tgtgtgcaga gtgactgatt ttaaaggaca tgga           114

<210> 220
<211> 93
<212> DNA
```

72

```
        <213> Homo sapien

        <400> 220
actagccagc acaaaaggca gggtagcctg aattgctttc tgctctttac atttctttta    60
aaataagcat ttagtgctca gtccctactg agt                                  93

        <210> 221
        <211> 167
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(167)
        <223> n = A,T,C or G

        <400> 221
actangtgca ggtgcgcaca aatatttgtc gatattccct tcatcttgga ttccatgagg    60
tcttttgccc agcctgtggc tctactgtag taagtttctg ctgatgagga gccagnatgc   120
cccccactac cttccctgac gctccccana aatcacccaa cctctgt                 167

        <210> 222
        <211> 351
        <212> DNA
        <213> Homo sapien

        <400> 222
agggcgtggt gcggagggcg gtactgacct cattagtagg aggatgcatt ctggcacccc    60
gttcttcacc tgtcccccaa tccttaaaag gccatactgc ataaagtcaa caacagataa   120
atgtttgctg aattaaagga tggatgaaaa aaattaataa tgaattttttg cataatccaa   180
ttttctcttt tatatttcta gaagaagttt ctttgagcct attagatccc gggaatcttt   240
taggtgagca tgattagaga gcttgtaggt tgcttttaca tatatctggc atatttgagt   300
ctcgtatcaa aacaatagat tggtaaaggt ggtattattg tattgataag t            351

        <210> 223
        <211> 383
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(383)
        <223> n = A,T,C or G

        <400> 223
aaaacaaaca aacaaaaaaa acaattcttc attcagaaaa attatcttag ggactgatat    60
tggtaattat ggtcaattta atwrtrttkt ggggcatttc cttacattgt cttgacaaga   120
ttaaaatgtc tgtgccaaaa ttttgtattt tatttggaga cttcttatca aaagtaatgc   180
tgccaaagga agtctaagga attagtagtg ttcccmtcac ttgtttggag tgtgctattc   240
taaaagattt tgatttcctg gaatgacaat tatatttttaa ctttggtggg ggaaanagtt   300
ataggaccac agtcttcact tctgatactt gtaaattaat cttttattgc acttgttttg   360
accattaagc tatatgttta aaa                                           383

        <210> 224
        <211> 320
        <212> DNA
        <213> Homo sapien

        <400> 224
cccctgaagg cttcttgtta gaaaatagta cagttacaac caataggaac aacaaaaaga    60
aaaagtttgt gacattgtag tagggagtgt gtaccccttat ctccccatca aaaaaaaaat   120
ggatacatgg ttaaaggata raagggcaat attttatcat atgttctaaa agagaaggaa   180
```

73

```
gagaaaatac tactttctcr aaatggaagc ccttaaaggt gctttgatac tgaaggacac        240
aaatgtggcc gtccatcctc ctttaragtt gcatgacttg gacacggtaa ctgttgcagt        300
tttaractcm gcattgtgac                                                    320
```

        <210> 225
        <211> 1214
        <212> DNA
        <213> Homo sapien

        <400> 225
```
gaggactgca gcccgcactc gcagccctgg caggcggcac tggtcatgga aaacgaattg         60
ttctgctcgg gcgtcctggt gcatccgcag tgggtgctgt cagccgcaca ctgtttccag        120
aactcctaca ccatcgggct gggcctgcac agtcttgagg ccgaccaaga gccagggagc        180
cagatggtgg aggccagcct ctccgtacgg cacccagagt acaacagacc cttgctcgct        240
aacgacctca tgctcatcaa gttggacgaa tccgtgtccg agtctgacac catccggagc        300
atcagcattg cttcgcagtg ccctaccgcg gggaactctt gcctcgtttc tggctggggt        360
ctgctggcga acggcagaat gcctaccgtg ctgcagtgcg tgaacgtgtc ggtggtgtct        420
gaggaggtct gcagtaagct ctatgacccg ctgtaccacc ccagcatgtt ctgcgccggc        480
ggagggcaag accagaagga ctcctgcaac ggtgactctg gggggcccct gatctgcaac        540
gggtacttgc agggccttgt gtctttcgga aaagccccgt gtggccaagt tggcgtgcca        600
ggtgtctaca ccaacctctg caaattcact gagtggatag agaaaaccgt ccaggccagt        660
taactctggg gactgggaac ccatgaaatt gacccccaaa tacatcctgc ggaaggaatt        720
caggaatatc tgttcccagc ccctcctccc tcaggcccag gagtccaggc ccccagcccc        780
tcctccctca aaccaagggt acagatcccc agcccctcct ccctcagacc caggagtcca        840
gaccccccag cccctcctcc ctcagaccca ggagtccagc ccctcctccc tcagacccag        900
gagtccagac cccccagccc ctcctccctc agacccaggg gtccaggccc ccaacccctc        960
ctccctcaga ctcagaggtc caagccccca acccctcctt ccccagaccc agaggtccag       1020
gtcccagccc ctcctccctc agacccagcg gtccaatgcc acctagactc tccctgtaca       1080
cagtgccccc ttgtggcacg ttgacccaac cttaccagtt ggttttttcat tttttgtccc       1140
tttcccctag atccagaaat aaagtctaag agaagcgcaa aaaaaaaaaa aaaaaaaaaa       1200
aaaaaaaaaa aaaa                                                          1214
```

        <210> 226
        <211> 119
        <212> DNA
        <213> Homo sapien

        <400> 226
```
acccagtatg tgcagggaga cggaaccccca tgtgacagcc cactccacca gggttcccaa        60
agaacctggc ccagtcataa tcattcatcc tgacagtggc aataatcacg ataaccagt         119
```

        <210> 227
        <211> 818
        <212> DNA
        <213> Homo sapien

        <400> 227
```
acaattcata gggacgacca atgaggacag ggaatgaacc cggctctccc ccagccctga         60
ttttttgctac atatgggggtc ccttttcatt ctttgcaaaa acactgggtt ttctgagaac       120
acggacggtt cttagcacaa tttgtgaaat ctgtgtaraa ccgggctttg caggggagat        180
aattttcctc ctctggagga aaggtggtga ttgacaggca gggagacagt gacaaggcta        240
gagaaagcca cgctcggcct tctctgaacc aggatggaac ggcagacccc tgaaaacgaa        300
gcttgtcccc ttccaatcag ccacttctga gaaccccccat ctaacttcct actggaaaag       360
agggcctcct caggagcagt ccaagagttt tcaaagataa cgtgacaact accatctaga        420
ggaaagggtg caccctcagc agagaagccg agagcttaac tctggtcgtt tccagagaca        480
acctgctggc tgtcttggga tgcgcccagc ctttgagagg ccactacccc atgaacttct        540
gccatccact ggacatgaag ctgaggacac tgggcttcaa cactgagttg tcatgagagg       600
gacaggctct gccctcaagc cggctgaggg cagcaaccac tctcctcccc tttctcacgc        660
aaagccattc ccacaaatcc agaccatacc atgaagcaac gagacccaaa cagtttggct        720
caagaggata tgaggactgt ctcagcctgg ctttgggctg acaccatgca cacacacaag       780
gtccacttct aggttttcag cctagatggg agtcgtgt                                818
```

74

```
<210> 228
<211> 744
<212> DNA
<213> Homo sapien

<400> 228
actggagaca ctgttgaact tgatcaagac ccagaccacc ccaggtctcc ttcgtgggat      60
gtcatgacgt ttgacatacc tttggaacga gcctcctcct tggaagatgg aagaccgtgt     120
tcgtggccga cctggcctct cctggcctgt ttcttaagat gcggagtcac atttcaatgg     180
taggaaaagt ggcttcgtaa aatagaagag cagtcactgt ggaactacca aatggcgaga     240
tgctcggtgc acattggggt gctttggggt aaaagattta tgagccaact attctctgga     300
accagattct aggccagttt gttccactga agcttttccc acagcagtcc acctctgcag     360
gctggcagct gaatggcttg ccggtggctc tgtggcaaga tcacactgag atcgatgggt     420
gagaaggcta ggatgcttgt ctagtgttct tagctgtcac gttggctcct tccaggttgg     480
ccagacggtg ttggccactc ccttctaaaa cacaggcgcc ctcctggtga cagtgacccg     540
ccgtggtatg ccttggccca ttccagcagt cccagttatg catttcaagt ttggggtttg     600
ttcttttcgt taatgttcct ctgtgttgtc agctgtcttc atttcctggg ctaagcagca     660
ttgggagatg tggaccagag atccactcct taagaaccag tggcgaaaga cactttcttt     720
cttcactctg aagtagctgg tggt                                            744

<210> 229
<211> 300
<212> DNA
<213> Homo sapien

<400> 229
cgagtctggg ttttgtctat aaagtttgat ccctcctttt ctcatccaaa tcatgtgaac      60
cattacacat cgaaataaaa gaaaggtggc agacttgccc aacgccaggc tgacatgtgc     120
tgcagggttg ttgttttttta attattattg ttagaaacgt cacccacagt ccctgttaat     180
ttgtatgtga cagccaactc tgagaaggtc ctatttttcc acctgcagag gatccagtct     240
cactaggctc ctccttgccc tcacactgga gtctccgcca gtgtgggtgc ccactgacat     300

<210> 230
<211> 301
<212> DNA
<213> Homo sapien

<400> 230
cagcagaaca aatacaaata tgaagagtgc aaagatctca taaaatctat gctgaggaat      60
gagcgacagt tcaaggagga gaagcttgca gagcagctca agcaagctga ggagctcagg     120
caatataaag tcctggttca cactcaggaa cgagagctga cccagttaag ggagaagttg     180
cgggaaggga gagatgcctc cctctcattg aatgagcatc tccaggccct cctcactccg     240
gatgaaccgg acaagtccca ggggcaggac ctccaagaaa cagacctcgg ccgcgaccac     300
g                                                                      301

<210> 231
<211> 301
<212> DNA
<213> Homo sapien

<400> 231
gcaagcacgc tggcaaatct ctgtcaggtc agctccagag aagccattag tcattttagc      60
caggaactcc aagtccacat ccttggcaac tggggacttg cgcaggttag ccttgaggat     120
ggcaacacgg gacttctcat caggaagtgg gatgtagatg agctgatcaa gacggccagg     180
tctgaggatg gcaggatcaa tgatgtcagg ccggttggta ccgccaatga tgaacacatt     240
tttttttgtg gacatgccat ccatttctgt caggatctgg ttgatgactc ggtcagcagc     300
c                                                                      301

<210> 232
<211> 301
<212> DNA
<213> Homo sapien
```

```
        <400> 232
agtaggtatt tcgtgagaag ttcaacacca aaactggaac atagttctcc ttcaagtgtt      60
ggcgacagcg gggcttcctg attctggaat ataactttgt gtaaattaac agccacctat     120
agaagagtcc atctgctgtg aaggagagac agagaactct gggttccgtc gtcctgtcca     180
cgtgctgtac caagtgctgg tgccagcctg ttacctgttc tcactgaaaa tctggctaat     240
gctcttgtgt atcacttctg attctgacaa tcaatcaatc aatggcctag agcactgact     300
g                                                                     301

        <210> 233
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 233
atgactgact tcccagtaag gctctctaag gggtaagtag gaggatccac aggatttgag      60
atgctaaggc cccagagatc gtttgatcca accctcttat tttcagaggg gaaaatgggg     120
cctagaagtt acagagcatc tagctggtgc gctggcaccc ctggcctcac acagactccc     180
gagtagctgg gactacaggc acacagtcac tgaagcaggc cctgttagca attctatgcg     240
tacaaattaa catgagatga gtagagactt tattgagaaa gcaagagaaa atcctatcaa     300
c                                                                     301

        <210> 234
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 234
aggtcctaca catcgagact catccatgat tgatatgaat ttaaaaatta caagcaaaga      60
cattttattc atcatgatgc tttcttttgt ttcttctttt cgttttcttc tttttctttt     120
tcaatttcag caacatactt ctcaatttct tcaggattta aaatcttgag ggattgatct     180
cgcctcatga cagcaagttc aatgtttttg ccacctgact gaaccacttc caggagtgcc     240
ttgatcacca gcttaatggt cagatcatct gcttcaatgg cttcgtcagt atagttcttc     300
t                                                                     301

        <210> 235
        <211> 283
        <212> DNA
        <213> Homo sapien

        <400> 235
tggggctgtg catcaggcgg gtttgagaaa tattcaattc tcagcagaag ccagaatttg      60
aattccctca tcttttaggg aatcatttac caggtttgga gaggattcag acagctcagg     120
tgctttcact aatgtctctg aacttctgtc cctctttgtt catggatagt ccaataaata     180
atgttatctt tgaactgatg ctcataggag agaatataag aactctgagt gatatcaaca     240
ttagggattc aaagaaatat tagatttaag ctcacactgg tca                       283

        <210> 236
      · <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 236
aggtcctcca ccaactgcct gaagcacggt taaaattggg aagaagtata gtgcagcata      60
aatactttta aatcgatcag atttccctaa cccacatgca atcttcttca ccagaagagg     120
tcggagcagc atcattaata ccaagcagaa tgcgtaatag ataaatacaa tggtatatag     180
tgggtagacg gcttcatgag tacagtgtac tgtggtatcg taatctggac ttgggttgta     240
aagcatcgtg taccagtcag aaagcatcaa tactcgacat gaacgaatat aaagaacacc     300
a                                                                     301

        <210> 237
        <211> 301
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76

```
        <212> DNA
        <213> Homo sapien

        <400> 237
cagtggtagt ggtggtggac gtggcgttgg tcgtggtgcc ttttttggtg cccgtcacaa          60
actcaatttt tgttcgctcc tttttggcct tttccaattt gtccatctca attttctggg         120
ccttggctaa tgcctcatag taggagtcct cagaccagcc atggggatca aacatatcct         180
ttgggtagtt ggtgccaagc tcgtcaatgg cacagaatgg atcagcttct cgtaaatcta         240
gggttccgaa attctttctt cctttggata atgtagttca tatccattcc ctcctttatc         300
t                                                                        301


        <210> 238
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 238
gggcaggttt tttttttttt tttttgatg gtgcagaccc ttgctttatt tgtctgactt          60
gttcacagtt cagcccctg ctcagaaaac caacgggcca gctaaggaga ggaggaggca         120
ccttgagact tccggagtcg aggctctcca gggttcccca gcccatcaat cattttctgc         180
accccctgcc tgggaagcag ctccctgggg ggtgggaatg ggtgactaga agggatttca         240
gtgtgggacc cagggtctgt tcttcacagt aggaggtgga agggatgact aatttcttta         300
t                                                                        301


        <210> 239
        <211> 239
        <212> DNA
        <213> Homo sapien

        <400> 239
ataagcagct agggaattct ttatttagta atgtcctaac ataaaagttc acataactgc          60
ttctgtcaaa ccatgatact gagctttgtg acaacccaga aataactaag agaaggcaaa         120
cataatacct tagagatcaa gaaacattta cacagttcaa ctgtttaaaa atagctcaac         180
attcagccag tgagtagagt gtgaatgcca gcatacacag tatacaggtc cttcaggga         239


        <210> 240
        <211> 300
        <212> DNA
        <213> Homo sapien

        <400> 240
ggtcctaatg aagcagcagc ttccacattt taacgcaggt ttacggtgat actgtccttt          60
gggatctgcc ctccagtgga accttttaag gaagaagtgg gcccaagcta agttccacat         120
gctgggtgag ccagatgact tctgttccct ggtcactttc ttcaatgggg cgaatggggg         180
ctgccaggtt tttaaaatca tgcttcatct tgaagcacac ggtcacttca ccctcctcac         240
gctgtgggtg tactttgatg aaaatacccca ctttgttggc ctttctgaag ctataatgtc         300


        <210> 241
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 241
gaggtctggt gctgaggtct ctgggctagg aagaggagtt ctgtggagct ggaagccaga          60
cctctttgga ggaaactcca gcagctatgt tggtgtctct gagggaatgc aacaaggctg         120
ctcctccatg tattggaaaa ctgcaaactg gactcaactg gaaggaagtg ctgctgccag         180
tgtgaagaac cagcctgagg tgacagaaac ggaagcaaac aggaacagcc agtcttttct         240
tcctcctcct gtcatacggt ctctctcaag catcctttgt tgtcaggggc ctaaaaggga         300
g                                                                        301


        <210> 242
        <211> 301
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77

```
        <212> DNA
        <213> Homo sapien

        <400> 242
ccgaggtcct gggatgcaac caatcactct gtttcacgtg acttttatca ccatacaatt        60
tgtggcattt cctcattttc tacattgtag aatcaagagt gtaaataaat gtatatcgat       120
gtcttcaaga atatatcatt ccttttttcac tagaacccat tcaaaatata agtcaagaat      180
cttaatatca acaaatatat caagcaaact ggaaggcaga ataactacca taatttagta       240
taagtaccca aagtttttata aatcaaaagc cctaatgata accattttta gaattcaatc      300
a                                                                         301

        <210> 243
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 243
aggtaagtcc cagtttgaag ctcaaaagat ctggtatgag cataggctca tcgacgacat        60
ggtggcccaa gctatgaaat cagagggagg cttcatctgg gcctgtaaaa actatgatgg       120
tgacgtgcag tcggactctg tggcccaagg gtatggctct ctcggcatga tgaccagcgt       180
gctggtttgt ccagatggca agacagtaga agcagaggct gcccacggga ctgtaacccg       240
tcactaccgc atgttccaga aaggacagga gacgtccacc aatcccattg cttccatttt       300
t                                                                         301

        <210> 244
        <211> 300
        <212> DNA
        <213> Homo sapien

        <400> 244
gctggtttgc aagaatgaaa tgaatgattc tacagctagg acttaacctt gaaatggaaa        60
gtcatgcaat cccatttgca ggatctgtct gtgcacatgc ctctgtagag agcagcattc       120
ccagggacct tggaaacagt tgacactgta aggtgcttgc tccccaagac acatcctaaa       180
aggtgttgta atggtgaaaa cgtcttcctt ctttattgcc ccttcttatt tatgtgaaca       240
actgtttgtc ttttgtgtat cttttttaaa ctgtaaagtt caattgtgaa aatgaatatc       300

        <210> 245
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 245
gtctgagtat ttaaaatgtt attgaaatta tccccaacca atgttagaaa agaaagaggt        60
tatatactta gataaaaaat gaggtgaatt actatccatt gaaatcatgc tcttagaatt       120
aaggccagga gatattgtca ttaatgtara cttcaggaca ctagagtata gcagccctat       180
gttttcaaag agcagagatg caattaaata ttgtttagca tcaaaaaggc cactcaatac       240
agctaataaa atgaaagacc taatttctaa agcaattctt tataatttac aaagttttaa       300
g                                                                         301

        <210> 246
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 246
ggtctgtcct acaatgcctg cttcttgaaa gaagtcggca ctttctagaa tagctaaata        60
acctgggctt attttaaaga actatttgta gctcagattg gttttcctat ggctaaaata       120
agtgcttctt gtgaaaatta aataaaacag ttaattcaaa gccttgatat atgttaccac       180
taacaatcat actaaatata ttttgaagta caaagtttga catgctctaa agtgacaacc       240
caaatgtgtc ttacaaaaca cgttcctaac aaggtatgct ttacactacc aatgcagaaa       300
c                                                                         301
```

78

```
<210> 247
<211> 301
<212> DNA
<213> Homo sapien

<400> 247
aggtcctttg gcagggctca tggatcagag ctcaaactgg agggaaaggc atttcgggta        60
gcctaagagg gcgactggcg gcagcacaac caaggaaggc aaggttgttt cccccacgct       120
gtgtcctgtg ttcaggtgcg acacacaatc ctcatgggaa caggatcacc catgcgctgc       180
ccttgatgat caaggttggg gcttaagtgg attaagggag gcaagttctg ggttccttgc       240
cttttcaaac catgaagtca ggctctgtat ccctcctttt cctaactgat attctaacta       300
a                                                                        301

<210> 248
<211> 301
<212> DNA
<213> Homo sapien

<400> 248
aggtccttgg agatgccatt tcagccgaag gactcttctw ttcggaagta caccctcact        60
attaggaaga ttcttagggg taatttttct gaggaaggag aactagccaa cttaagaatt       120
acaggaagaa agtggtttgg aagacagcca aagaaataaa agcagattaa attgtatcag       180
gtacattcca gcctgttggc aactccataa aaacatttca gattttaatc ccgaatttag       240
ctaatgagac tggattttttg tttttatgt tgtgtgtcgc agagctaaaa actcagttcc       300
c                                                                        301

<210> 249
<211> 301
<212> DNA
<213> Homo sapien

<400> 249
gtccagagga agcacctggt gctgaactag gcttgccctg ctgtgaactt gcacttggag        60
ccctgacgct gctgttctcc ccgaaaaacc cgaccgacct ccgcgatctc cgtcccgccc       120
ccagggagac acagcagtga ctcagagctg gtcgcacact gtgcctccct cctcaccgcc       180
catcgtaatg aattattttg aaaattaatt ccaccatcct ttcagattct ggatggaaag       240
actgaatctt tgactcagaa ttgtttgctg aaaagaatga tgtgactttc ttagtcattt       300
a                                                                        301

<210> 250
<211> 301
<212> DNA
<213> Homo sapien

<400> 250
ggtctgtgac aaggacttgc aggctgtggg aggcaagtga cccttaacac tacacttctc        60
cttatcttta ttggcttgat aaacataatt atttctaaca ctagcttatt tccagttgcc       120
cataagcaca tcagtacttt tctctggctg gaatagtaaa ctaaagtatg gtacatctac        180
ctaaaagact actatgtgga ataatacata ctaatgaagt attacatgat ttaaagacta       240
caataaaacc aaacatgctt ataacattaa gaaaaacaat aaagatacat gattgaaacc       300
a                                                                        301

<210> 251
<211> 301
<212> DNA
<213> Homo sapien

<400> 251
gccgaggtcc tacatttggc ccagtttccc cctgcatcct ctccagggcc cctgcctcat        60
agacaacctc atagagcata ggagaactgg ttgccctggg ggcaggggga ctgtctggat       120
ggcaggggtc ctcaaaaatg ccactgtcac tgccaggaaa tgcttctgag cagtacacct       180
cattgggatc aatgaaaagc ttcaagaaat cttcaggctc actctcttga aggcccggaa       240
```

79

```
cctctggagg ggggcagtgg aatcccagct ccaggacgga tcctgtcgaa aagatatcct       300
c                                                                       301

        <210> 252
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 252
gcaaccaatc actctgtttc acgtgacttt tatcaccata caatttgtgg catttcctca       60
ttttctacat tgtagaatca agagtgtaaa taaatgtata tcgatgtctt caagaatata      120
tcattccttt ttcactagga acccattcaa aatataagtc aagaatctta atatcaacaa      180
atatatcaag caaactggaa ggcagaataa ctaccataat ttagtataag tacccaaagt      240
tttataaatc aaaagcccta atgataacca tttttagaat tcaatcatca ctgtagaatc      300
a                                                                       301

        <210> 253
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 253
ttccctaaga agatgttatt ttgttgggtt ttgttccccc tccatctcga ttctcgtacc       60
caactaaaaa aaaaaaataa agaaaaaatg tgctgcgttc tgaaaaataa ctccttagct      120
tggtctgatt gttttcagac cttaaaatat aaacttgttt cacaagcttt aatccatgtg      180
gatttttttt cttagagaac cacaaaacat aaaaggagca agtcggactg aatacctgtt      240
tccatagtgc ccacagggta ttcctcacat tttctccata ggaaaatgct ttttcccaag      300
g                                                                       301

        <210> 254
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 254
cgctgcgcct ttcccttggg ggaggggcaa ggccagaggg ggtccaagtg cagcacgagg       60
aacttgacca attcccttga agcgggtggg ttaaaccctg taaatgggaa caaaatcccc      120
ccaaatctct tcatcttacc ctggtggact cctgactgta gaattttttg gttgaaacaa      180
gaaaaaaata aagctttgga cttttcaagg ttgcttaaca ggtactgaaa gactggcctc      240
acttaaactg agccaggaaa agctgcagat ttattaatgg gtgtgttagt gtgcagtgcc      300
t                                                                       301

        <210> 255
        <211> 302
        <212> DNA
        <213> Homo sapien

        <400> 255
agcttttttt tttttttttt tttttttttt ttcattaaaa aatagtgctc tttattataa       60
attactgaaa tgtttctttt ctgaatataa atataaatat gtgcaaagtt tgacttggat      120
tgggattttg ttgagttctt caagcatctc ctaataccct caagggcctg agtagggggg      180
aggaaaaagg actggaggtg gaatctttat aaaaaacaag agtgattgag gcagattgta      240
aacattatta aaaaacaaga aacaaacaaa aaaatagaga aaaaaccac cccaacacac      300
aa                                                                      302

        <210> 256
        <211> 301
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
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80

```
          <222> (1)...(301)
          <223> n = A,T,C or G

          <400> 256
gttccagaaa acattgaagg tggcttccca aagtctaact agggataccc cctctagcct        60
aggaccctcc tccccacacc tcaatccacc aaaccatcca taatgcaccc agataggccc       120
accccaaaa  gcctggacac cttgagcaca cagttatgac caggacagac tcatctctat       180
aggcaaatag ctgctggcaa actggcatta cctggtttgt ggggatgggg gggcaagtgt       240
gtggcctctc ggcctggtta gcaagaacat tcagggtagg cctaagttan tcgtgttagt       300
t                                                                       301


          <210> 257
          <211> 301
          <212> DNA
          <213> Homo sapien

          <400> 257
gttgtggagg aactctggct tgctcattaa gtcctactga ttttcactat cccctgaatt        60
tccccactta tttttgtctt tcactatcgc aggccttaga agaggtctac ctgcctccag       120
tcttacctag tccagtctac cccctggagt tagaatggcc atcctgaagt gaaaagtaat       180
gtcacattac tcccttcagt gatttcttgt agaagtgcca atccctgaat gccaccaaga       240
tcttaatctt cacatcttta atcttatctc tttgactcct ctttacaccg gagaaggctc       300
c                                                                       301


          <210> 258
          <211> 301
          <212> DNA
          <213> Homo sapien

          <220>
          <221> misc_feature
          <222> (1)...(301)
          <223> n = A,T,C or G

          <400> 258
cagcagtagt agatgccgta tgccagcacg cccagcactc ccaggatcag caccagcacc        60
aggggcccag ccaccaggcg cagaagcaag ataaacagta ggctcaagac cagagccacc       120
cccagggcaa caagaatcca ataccaggac tgggcaaaat cttcaaagat cttaacactg       180
atgtctcggg cattgaggct gtcaataana cgctgatccc ctgctgtatg gtggtgtcat       240
tggtgatccc tgggagcgcc ggtggagtaa cgttggtcca tggaaagcag cgcccacaac       300
t                                                                       301


          <210> 259
          <211> 301
          <212> DNA
          <213> Homo sapien

          <220>
          <221> misc_feature
          <222> (1)...(301)
          <223> n = A,T,C or G

          <400> 259
tcatatatgc aaacaaatgc agactangcc tcaggcagag actaaaggac atctcttggg        60
gtgtcctgaa gtgatttgga cccctgaggg cagacaccta agtaggaatc ccagtgggaa       120
gcaaagccat aaggaagccc aggattcctt gtgatcagga agtgggccag gaaggtctgt       180
tccagctcac atctcatctg catgcagcac ggaccggatg cgcccactgg gtcttggctt       240
ccctcccatc ttctcaagca gtgtccttgt tgagccattt gcatccttgg ctccaggtgg       300
c                                                                       301


          <210> 260
          <211> 301
```

81

```
        <212> DNA
        <213> Homo sapien

        <400> 260
tttttttct    ccctaaggaa   aaagaaggaa   caagtctcat   aaaaccaaat   aagcaatggt         60
aaggtgtctt   aacttgaaaa   agattaggag   tcactggttt   acaagttata   attgaatgaa        120
agaactgtaa   cagccacagt   tggccatttc   atgccaatgg   cagcaaacaa   caggattaac        180
tagggcaaaa   taaataagtg   tgtggaagcc   ctgataagtg   cttaataaac   agactgattc        240
actgagacat   cagtacctgc   ccgggcggcc   gctcgagccg   aattctgcag   atatccatca        300
c                                                                                  301

        <210> 261
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 261
aaatattcga   gcaaatcctg   taactaatgt   gtctccataa   aaggctttga   actcagtgaa         60
tctgcttcca   tccacgattc   tagcaatgac   ctctcggaca   tcaaagctcc   tcttaaggtt        120
agcaccaact   attccataca   attcatcagc   aggaaataaa   ggctcttcag   aaggttcaat        180
ggtgacatcc   aatttcttct   gataatttag   attcctcaca   accttcctag   ttaagtgaag        240
ggcatgatga   tcatccaaag   cccagtggtc   acttactcca   gactttctgc   aatgaagatc        300
a                                                                                  301

        <210> 262
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 262
gaggagagcc   tgttacagca   tttgtaagca   cagaatactc   caggagtatt   tgtaattgtc         60
tgtgagcttc   ttgccgcaag   tctctcagaa   atttaaaaag   atgcaaatcc   ctgagtcacc        120
cctagacttc   ctaaaccaga   tcctctgggg   ctggaacctg   gcactctgca   tttgtaatga        180
gggctttctg   gtgcacacct   aattttgtgc   atctttgccc   taaatcctgg   attagtgccc        240
catcattacc   cccacattat   aatgggatag   attcagagca   gatactctcc   agcaaagaat        300
c                                                                                  301

        <210> 263
        <211> 301
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G

        <400> 263
tttagcttgt   ggtaaatgac   tcacaaaact   gattttaaaa   tcaagttaat   gtgaattttg         60
aaaattacta   cttaatccta   attcacaata   acaatggcat   taaggtttga   cttgagttgg        120
ttcttagtat   tatttatggt   aaataggctc   ttaccacttg   caaataactg   gccacatcat        180
taatgactga   cttcccagta   aggctctcta   aggggtaagt   angaggatcc   acaggatttg        240
agatgctaag   gccccagaga   tcgtttgatc   caaccctctt   attttcagag   gggaaaatgg        300
g                                                                                  301

        <210> 264
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 264
aaagacgtta   aaccactcta   ctaccacttg   tggaactctc   aaagggtaaa   tgacaaascc         60
```

82

```
aatgaatgac tctaaaaaca atatttacat ttaatggttt gtagacaata aaaaaacaag          120
gtggatagat ctagaattgt aacattttaa gaaaaccata scatttgaca gatgagaaag          180
ctcaattata gatgcaaagt tataactaaa ctactatagt agtaaagaaa tacatttcac          240
acccttcata taaattcact atcttggctt gaggcactcc ataaaatgta tcacgtgcat          300
a                                                                          301
```

        <210> 265
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 265
```
tgcccaagtt atgtgtaagt gtatccgcac ccagaggtaa aactacactg tcatctttgt .        60
cttcttgtga cgcagtattt cttctctggg gagaagccgg gaagtcttct cctggctcta          120
catattcttg gaagtctcta atcaactttt gttccatttg tttcatttct tcaggaggga          180.
ttttcagttt gtcaacatgt tctctaacaa cacttgccca tttctgtaaa gaatccaaag          240
cagtccaagg ctttgacatg tcaacaacca gcataactag agtatccttc agagatacgg          300
c                                                                          301
```

        <210> 266
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 266
```
taccgtctgc ccttcctccc atccaggcca tctgcgaatc tacatgggtc ctcctattcg          60
acaccagatc actctttcct ctacccacag gcttgctatg agcaagagac acaacctcct          120
ctcttctgtg ttccagcttc ttttcctgtt cttcccaccc cttaagttct attcctgggg          180
atagagacac caatacccat aacctctctc ctaagcctcc ttataaccca gggtgcacag          240
cacagactcc tgacaactgg taaggccaat gaactgggag ctcacagctg_gctgtgcctg          300
a                                                                          301
```

        <210> 267
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 267
```
aaagagcaca ggccagctca gcctgccctg gccatctaga ctcagcctgg ctccatgggg          60
gttctcagtg ctgagtccat ccaggaaaag ctcacctaga ccttctgagg ctgaatcttc          120
atcctcacag gcagcttctg agagcctgat attcctagcc ttgatggtct ggagtaaagc          180
ctcattctga ttcctctcct tcttttcttt caagttggct ttcctcacat ccctctgttc          240
aattcgcttc.agcttgtctg ctttagccct catttccaga agcttcttct ctttggcatc          300
t                                                                          301
```

        <210> 268
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 268
```
aatgtctcac tcaactactt cccagcctac cgtggcctaa ttctgggagt tttcttctta          60
gatcttggga gagctggttc ttctaaggag aaggaggaag gacagatgta actttggatc          120
tcgaagagga agtctaatgg aagtaattag tcaacggtcc ttgtttagac tcttggaata          180
tgctgggtgg ctcagtgagc cctttttggag aaagcaagta ttattcttaa ggagtaacca          240
cttcccattg ttctactttc taccatcatc aattgtatat tatgtattct ttggagaact          300
a                                                                          301
```

        <210> 269
        <211> 301
        <212> DNA
        <213> Homo sapien

83

```
        <400> 269
taacaatata cactagctat cttttaact gtccatcatt agcaccaatg aagattcaat        60
aaaattacct ttattcacac atctcaaaac aattctgcaa attcttagtg aagtttaact       120
atagtcacag accttaaata ttcacattgt tttctatgtc tactgaaaat aagttcacta       180
cttttctgga tattctttac aaaatcttat taaaattcct ggtattatca cccccaatta      240
tacagtagca caaccacctt atgtagtttt tacatgatag ctctgtagaa gtttcacatc       300
t                                                                        301


        <210> 270
        <211> 301
        <212> DNA
        <213> Homo sapien


        <400> 270
cattgaagag cttttgcgaa acatcagaac acaagtgctt ataaaattaa ttaagcctta       60
cacaagaata catattcctt ttatttctaa ggagttaaac atagatgtag ctgatgtgga       120
gagcttgctg gtgcagtgca tattggataa cactattcat ggccgaattg atcaagtcaa       180
ccaactcctt gaactggatc atcagaagaa gggtggtgca cgatatactg cactagataa       240
tggaccaacc aactaaattc tctcaccagg ctgtatcagt aaactggctt aacagaaaac       300
a                                                                        301


        <210> 271
        <211> 301
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G


        <400> 271
aaaaggttct cataagatta acaatttaaa taaatatttg atagaacatt ctttctcatt       60
tttatagctc atctttaggg ttgatattca gttcatgctt cccttgctgt tcttgatcca       120
gaattgcaat cacttcatca gcctgtattc gctccaattc tctataaagt gggtccaagg       180
tgaaccacag agccacagca cacctctttc ccttggtgac tgccttcacc ccatganggt       240
tctctcctcc agatganaac tgatcatgcg cccacatttt gggtttttata gaagcagtca     300
c                                                                        301


        <210> 272
        <211> 301
        <212> DNA
        <213> Homo sapien


        <400> 272
taaattgcta agccacagat aacaccaatc aaatggaaca aatcactgtc ttcaaatgtc       60
ttatcagaaa accaaatgag cctggaatct tcataatacc taaacatgcc gtatttagga       120
tccaataatt ccctcatgat gagcaagaaa aattctttgc gcacccctcc tgcatccaca       180
gcatcttctc caacaaatat aaccttgagt ggcttcttgt aatctatgtt ctttgttttc      240
ctaaggactt ccattgcatc tcctacaata ttttctctac gcaccactag aattaagcag      300
g                                                                        301


        <210> 273
        <211> 301
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G
```

84

```
        <400> 273
acatgtgtgt atgtgtatct ttgggaaaan aanaagacat cttgtttayt attttttgg         60
agagangctg ggacatggat aatcacwtaa tttgctayta tyactttaat ctgactygaa        120
gaaccgtcta aaaataaaat ttaccatgtc dtatattcct tatagtatgc ttatttcacc        180
ttytttctgt ccagagagag tatcagtgac ananatttma gggtgaamac atgmattggt        240
gggacttnty tttacngagm accctgcccg sgcgccctcg makcngantt ccgcsananc        300
t                                                                        301


        <210> 274
        <211> 301
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G

        <400> 274
cttatatact ctttctcaga ggcaaaagag gagatgggta atgtagacaa ttctttgagg         60
aacagtaaat gattattaga gagaangaat ggaccaagga gacagaaatt aacttgtaaa        120
tgattctctt tggaatctga atgagatcaa gaggccagct ttagcttgtg gaaaagtcca        180
tctaggtatg gttgcattct cgtcttcttt tctgcagtag ataatgaggt aaccgaaggc        240
aattgtgctt cttttgataa gaagctttct tggtcatatc aggaaattcc aganaaagtc        300
c                                                                        301


        <210> 275
        <211> 301
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G

        <400> 275
tcggtgtcag cagcacgtgg cattgaacat tgcaatgtgg agcccaaacc acagaaaatg         60
gggtgaaatt ggccaacttt ctattaactt atgttggcaa ttttgccacc aacagtaagc        120
tggcccttct aataaaagaa aattgaaagg tttctcacta aacggaatta agtagtggag        180
tcaagagact cccaggcctc agcgtacctg cccggcggc cgctcgaagc cgaattctgc        240
agatatccat cacactggcg gncgctcgan catgcatcta gaaggnccaa ttcgccctat        300
a                                                                        301


        <210> 276
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 276
tgtacacata ctcaataaat aaatgactgc attgtggtat tattactata ctgattatat         60
ttatcatgtg acttctaatt agaaatgta tccaaaagca aaacagcaga tatacaaaat        120
taaagagaca gaagatagac attaacagat aaggcaactt atacattgag aatccaaatc        180
caatacattt aaacatttgg gaaatgaggg ggacaaatgg aagccagatc aaatttgtgt        240
aaaactattc agtatgtttc ccttgcttca tgtctgagaa ggctctcctt caatggggat        300
g                                                                        301


        <210> 277
        <211> 301
        <212> DNA
        <213> Homo sapien
```

85

```
        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G

        <400> 277
tttgttgatg tcagtatttt attacttgcg ttatgagtgc tcacctggga aattctaaag          60
atacagagga cttggaggaa gcagagcaac tgaatttaat ttaaaagaag gaaaacattg         120
gaatcatggc actcctgata ctttcccaaa tcaacactct caatgcccca ccctcgtcct         180
caccatagtg gggagactaa agtggccacg gatttgcctt angtgtgcag tgcgttctga         240
gttcnctgtc gattacatct gaccagtctc cttttccga agtccntccg ttcaatcttg          300
c                                                                          301

        <210> 278
        <211> 301
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G

        <400> 278
taccactaca ctccagcctg ggcaacagag caagacctgt ctcaaagcat aaaatggaat          60
aacatatcaa atgaaacagg gaaaatgaag ctgacaattt atggaagcca gggcttgtca         120
cagtctctac tgttattatg cattacctgg gaatttatat aagcccttaa taataatgcc         180
aatgaacatc tcatgtgtgc tcacaatgtt ctggcactat tataagtgct tcacaggttt         240
tatgtgttct tcgtaacttt atggantagg tactcggccg cgaacacgct aagccgaatt         300
c                                                                          301

        <210> 279
        <211> 301
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G

        <400> 279
aaagcaggaa tgacaaagct tgcttttctg gtatgttcta ggtgtattgt gacttttact          60
gttatattaa ttgccaatat aagtaaatat agattatata tgtatagtgt ttcacaaagc         120
ttagaccttt accttccagc caccccacag tgcttgatat ttcagagtca gtcattggtt         180
atacatgtgt agttccaaag cacataagct agaanaanaa atatttctag ggagcactac         240
catctgtttt cacatgaaat gccacacaca tagaactcca acatcaattt cattgcacag         300
a                                                                          301

        <210> 280
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 280
ggtactggag ttttcctccc ctgtgaaaac gtaactactg ttgggagtga attgaggatg          60
tagaaaggtg gtggaaccaa attgtggtca atggaaatag gagaatatgg ttctcactct         120
tgagaaaaaa acctaagatt agcccaggta gttgcctgta acttcagttt ttctgcctgg         180
gtttgatata gtttagggtt ggggttagat taagatctaa attacatcag gacaaagaga         240
cagactatta actccacagt taattaagga ggtatgttcc atgtttattt gttaaagcag         300
t                                                                          301
```

```
<210> 281
<211> 301
<212> DNA
<213> Homo sapien

<400> 281
aggtacaaga aggggaatgg gaaagagctg ctgctgtggc attgttcaac ttggatattc        60
gccgagcaat ccaaatcctg aatgaagggg catcttctga aaaaggagat ctgaatctca       120
atgtggtagc aatggcttta tcgggttata cggatgagaa gaactccctt tggagagaaa       180
tgtgtagcac actgcgatta cagctaaata acccgtattt gtgtgtcatg tttgcatttc       240
tgacaagtga aacaggatct tacgatggag ttttgtatga aaacaaagtt gcagtacctc       300
g                                                                        301


<210> 282
<211> 301
<212> DNA
<213> Homo sapien

<400> 282
caggtactac agaattaaaa tactgacaag caagtagttt cttggcgtgc acgaattgca        60
tccagaaccc aaaaattaag aaattcaaaa agacattttg tgggcacctg ctagcacaga       120
agcgcagaag caaagcccag gcagaaccat gctaacctta cagctcagcc tgcacagaag       180
cgcagaagca aagcccaggc agaaccatgc taaccttaca gctcagcctg cacagaagcg       240
cagaagcaaa gcccaggcag aacatgctaa ccttacagct cagcctgcac agaagcacag       300
a                                                                        301


<210> 283
<211> 301
<212> DNA
<213> Homo sapien

<400> 283
atctgtatac ggcagacaaa ctttatarag tgtagagagg tgagcgaaag gatgcaaaag        60
cactttgagg gctttataat aatatgctgc ttgaaaaaaa aaatgtgtag ttgatactca       120
gtgcatctcc agacatagta aggggttgct ctgaccaatc aggtgatcat tttttctatc       180
acttcccagg ttttatgcaa aaattttgtt aaattctata atggtgatat gcatctttta       240
ggaaacatat acatttttaa aaatctattt tatgtaagaa ctgacagacg aatttgcttt       300
g                                                                        301


<210> 284
<211> 301
<212> DNA
<213> Homo sapien

<400> 284
caggtacaaa acgctattaa gtggcttaga atttgaacat ttgtggtctt tatttacttt        60
gcttcgtgtg tgggcaaagc aacatcttcc ctaaatatat attaccaaga aaagcaagaa       120
gcagattagg ttttttgacaa aacaaacagg ccaaaagggg gctgacctgg agcagagcat       180
ggtgagaggc aaggcatgag agggcaagtt tgttgtggac agatctgtgc ctactttatt       240
actggagtaa aagaaaacaa agttcattga tgtcgaagga tatatacagt gttagaaatt       300
a                                                                        301


<210> 285
<211> 301
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(301)
<223> n = A,T,C or G
```

87

```
      <400> 285
acatcaccat gatcggatcc cccacccatt atacgttgta tgtttacata aatactcttc          60
aatgatcatt agtgtttttaa aaaaaatact gaaaactcct tctgcatccc aatctctaac         120
caggaaagca aatgctattt acagacctgc aagccctccc tcaaacnaaa ctatttctgg          180
attaaatatg tctgacttct tttgaggtca cacgactagg caaatgctat ttacgatctg          240
caaaagctgt ttgaagagtc aaagccccca tgtgaacacg atttctggac cctgtaacag          300
t                                                                          301


      <210> 286
      <211> 301
      <212> DNA
      <213> Homo sapien


      <400> 286
taccactgca ttccagcctg ggtgacagag tgagactccg tctccaaaaa aaactttgct          60
tgtatattat ttttgcctta cagtggatca ttctagtagg aaaggacagt aagatttttt         120
atcaaaatgt gtcatgccag taagagatgt tatattcttt tctcatttct tccccaccca         180
aaaataagct accatatagc ttataagtct caaattttttg ccttttacta aaatgtgatt        240
gtttctgttc attgtgtatg cttcatcacc tatattaggc aaattccatt ttttcccttg         300
t                                                                          301


      <210> 287
      <211> 301
      <212> DNA
      <213> Homo sapien


      <400> 287
tacagatctg ggaactaaat attaaaaatg agtgtggctg gatatatgga gaatgttggg          60
cccagaagga acgtagagat cagatattac aacagctttg ttttgagggt tagaaatatg         120
aaatgatttg gttatgaacg cacagtttag gcagcagggc cagaatcctg accctctgcc         180
ccgtggttat ctcctcccca gcttggctgc ctcatgttat cacagtattc cattttgttt         240
gttgcatgtc ttgtgaagcc atcaagattt tctcgtctgt tttcctctca ttggtaatgc         300
t                                                                          301


      <210> 288
      <211> 301
      <212> DNA
      <213> Homo sapien


      <400> 288
gtacacctaa ctgcaaggac agctgaggaa tgtaatgggc agccgctttt aaagaagtag          60
agtcaatagg aagacaaatt ccagttccag ctcagtctgg gtatctgcaa agctgcaaaa         120
gatctttaaa gacaatttca agagaatatt tccttaaagt tggcaatttg gagatcatac         180
aaaagcatct gcttttgtga tttaatttag ctcatctggc cactggaaga atccaaacag         240
tctgccttaa ttttggatga atgcatgatg gaaattcaat aatttagaaa gttaaaaaaa         300
a                                                                          301


      <210> 289
      <211> 301
      <212> DNA
      <213> Homo sapien


      <220>
      <221> misc_feature
      <222> (1)...(301)
      <223> n = A,T,C or G


      <400> 289
ggtacactgt ttccatgtta tgtttctaca cattgctacc tcagtgctcc tggaaactta          60
gcttttgatg tctccaagta gtccaccttc atttaactct ttgaaactgt atcatctttg         120
ccaagtaaga gtggtggcct atttcagctg ctttgacaaa atgactggct cctgacttaa         180
```

88

```
cgttctataa atgaatgtgc tgaagcaaag tgcccatggt ggcggcgaan aagagaaaga      240
tgtgttttgt tttggactct ctgtggtccc ttccaatgct gtgggtttcc aaccagngga      300
a                                                                       301
```

        <210> 290
        <211> 301
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G

        <400> 290
```
acactgagct cttcttgata aatatacaga atgcttggca tatacaagat tctatactac       60
tgactgatct gttcatttct ctcacagctc ttacccccaa aagctttcc accctaagtg       120
ttctgacctc cttttctaat cacagtaggg atagaggcag anccacctac aatgaacatg      180
gagttctatc aagaggcaga aacagcacag aatcccagtt ttaccattcg ctagcagtgc      240
tgccttgaac aaaaacattt ctccatgtct cattttcttc atgcctcaag taacagtgag      300
a                                                                       301
```

        <210> 291
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 291
```
caggtaccaa tttcttctat cctagaaaca tttcatttta tgttgttgaa acataacaac       60
tatatcagct agattttttt tctatgcttt acctgctatg gaaaatttga cacattctgc      120
tttactcttt tgtttatagg tgaatcacaa aatgtatttt tatgtattct gtagttcaat      180
agccatggct gttacttca tttaatttat ttagcataaa gacattatga aaaggcctaa      240
acatgagctt cacttcccca ctaactaatt agcatctgtt atttcttaac cgtaatgcct      300
a                                                                       301
```

        <210> 292
        <211> 301
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G

        <400> 292
```
accttttagt agtaatgtct aataataaat aagaaatcaa ttttataagg tccatatagc       60
tgtattaaat aatttttaag tttaaaagat aaaataccat cattttaaat gttggtattc      120
aaaaccaaag natataaccg aaaggaaaaa cagatgagac ataaaatgat ttgcnagatg      180
ggaaatatag tasttyatga atgttnatta aattccagtt ataatagtgg ctacacactc      240
tcactacaca cacagacccc acagtcctat atgccacaaa cacatttcca taacttgaaa      300
a                                                                       301
```

        <210> 293
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 293
```
ggtaccaagt gctggtgcca gcctgttacc tgttctcact gaaaagtctg gctaatgctc       60
ttgtgtagtc acttctgatt ctgacaatca atcaatcaat ggcctagagc actgactgtt      120
aacacaaacg tcactagcaa agtagcaaca gctttaagtc taaatacaaa gctgttctgt      180
```

89

```
gtgagaattt tttaaaaggc tacttgtata ataacccttg tcatttttaa tgtacctcgg          240
ccgcgaccac gctaagccga attctgcaga tatccatcac actggcggcc gctcgagcat          300
g                                                                          301
```

        <210> 294
        <211> 301
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G

        <400> 294
```
tgacccataa caatatacac tagctatctt tttaactgtc catcattagc accaatgaag          60
attcaataaa attacctta ttcacacatc tcaaaacaat tctgcaaatt cttagtgaag          120
tttaactata gtcacaganc ttaaatattc acattgtttt ctatgtctac tgaaaataag          180
ttcactactt ttctgggata ttctttacaa aatcttatta aaattcctgg tattatcacc          240
cccaattata cagtagcaca accaccttat gtagtttta catgatagct ctgtagaggt           300
t                                                                          301
```

        <210> 295
        <211> 305
        <212> DNA
        <213> Homo sapien

        <400> 295
```
gtactctttc tctcccctcc tctgaattta attctttcaa cttgcaattt gcaaggatta          60
cacatttcac tgtgatgtat attgtgttgc aaaaaaaaaa gtgtctttgt ttaaaattac          120
ttggtttgtg aatccatctt gcttttccc cattggaact agtcattaac ccatctctga          180
actggtagaa aaacrtctga agagctagtc tatcagcatc tgacaggtga attggatggt.         240
tctcagaacc atttcaccca dacagcctgt ttctatcctg tttaataaat tagtttgggt         300
tctct                                                                      305
```

        <210> 296
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 296
```
aggtactatg ggaagctgct aaaataatat ttgatagtaa aagtatgtaa tgtgctatct          60
cacctagtag taaactaaaa ataaactgaa actttatgga atctgaagtt attttccttg          120
attaaataga attaataaac caatatgagg aaacatgaaa ccatgcaatc tactatcaac          180
tttgaaaaag tgattgaacg aaccacttag ctttcagatg atgaacactg ataagtcatt          240
tgtcattact ataaatttta aaatctgtta ataagatggc ctatagggag gaaaaagggg          300
c                                                                          301
```

        <210> 297
        <211> 300
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(300)
        <223> n = A,T,C or G

        <400> 297
```
actgagtttt aactggacgc caagcaggca aggctggaag gttttgctct ctttgtgcta          60
aaggttttga aaaccttgaa ggagaatcat tttgacaaga agtacttaag agtctagaga          120
acaaagangt gaaccagctg aaagctctcg ggggaanctt acatgtgttg ttaggcctgt          180
```

90

```
tccatcattg ggagtgcact ggccatccct caaaatttgt ctgggctggc ctgagtggtc     240
accgcacctc ggccgcgacc acgctaagcc gaattctgca gatatccatc acactggcgg     300
```

    <210> 298
    <211> 301
    <212> DNA
    <213> Homo sapien

    <220>
    <221> misc_feature
    <222> (1)...(301)
    <223> n = A,T,C or G

    <400> 298
```
tatggggttt gtcacccaaa agctgatgct gagaaaggcc tccctggggc ccctcccgcg      60
ggcatctgag agacctggtg ttccagtgtt tctggaaatg ggtcccagtg ccgccggctg     120
tgaagctctc agatcaatca cgggaagggc ctggcggtgg tggccacctg gaaccaccct     180
gtcctgtctg tttacatttc actaycaggt tttctctggg cattacnatt tgttccccta     240
caacagtgac ctgtgcattc tgctgtggcc tgctgtgtct gcaggtggct ctcagcgagg     300
t                                                                      301
```

    <210> 299
    <211> 301
    <212> DNA
    <213> Homo sapien

    <400> 299
```
gttttgagac ggagtttcac tcttgttgcc cagactggac tgcaatggca gggtctctgc      60
tcactgcacc ctctgcctcc caggttcgag caattctcct gcctcagcct cccaggtagc     120
tgggattgca ggctcacgcc accatcccca gctaattttt ttgtattttt agtagagacg     180
gagtttcgcc atgttggcca gctggtctca aactcctgac ctcaagcgac ctgcctgcct     240
cggcctccca aagtgctgga attataggca tgagtcaaca cgcccagcct aaagatattt     300
t                                                                      301
```

    <210> 300
    <211> 301
    <212> DNA
    <213> Homo sapien

    <400> 300
```
attcagtttt atttgctgcc ccagtatctg taaccaggag tgccacaaaa tcttgccaga      60
tatgtcccac acccactggg aaaggctccc acctggctac ttcctctatc agctgggtca     120
gctgcattcc acaaggttct cagcctaatg agtttcacta cctgccagtc tcaaaactta     180
gtaaagcaag accatgacat tcccccacgg aaatcagagt ttgccccacc gtcttgttac     240
tataaagcct gcctctaaca gtccttgctt cttcacacca atcccgagcg catcccccat     300
g                                                                      301
```

    <210> 301
    <211> 301
    <212> DNA
    <213> Homo sapien

    <400> 301
```
ttaaattttt gagaggataa aaaggacaaa taatctagaa atgtgtcttc ttcagtctgc      60
agaggacccc aggtctccaa gcaaccacat ggtcaagggc atgaataatt aaaagttggt     120
gggaactcac aaagaccctc agagctgaga cacccacaac agtgggagct cacaaagacc     180
ctcagagctg agacacccac aacagtggga gctcacaaag accctcagag ctgagacacc     240
cacaacagca cctcgttcag ctgccacatg tgtgaataag gatgcaatgt ccagaagtgt     300
t                                                                      301
```

    <210> 302
    <211> 301

91

```
        <212> DNA
        <213> Homo sapien

        <400> 302
aggtacacat ttagcttgtg gtaaatgact cacaaaactg attttaaaat caagttaatg      60
tgaattttga aaattactac ttaatcctaa ttcacaataa caatggcatt aaggtttgac     120
ttgagttggt tcttagtatt atttatggta aataggctct taccacttgc aaataactgg     180
ccacatcatt aatgactgac ttcccagtaa ggctctctaa ggggtaagta ggaggatcca     240
caggatttga gatgctaagg ccccagagat cgtttgatcc aaccctctta ttttcagagg     300
g                                                                     301


        <210> 303
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 303
aggtaccaac tgtggaaata ggtagaggat cattttttct ttccatatca actaagttgt      60
atattgtttt ttgacagttt aacacatctt cttctgtcag agattctttc acaatagcac     120
tggctaatgg aactaccgct tgcatgttaa aaatggtggt ttgtgaaatg atcataggcc     180
agtaacgggt atgtttttct aactgatctt ttgctcgttc caaagggacc tcaagacttc     240
catcgatttt atatctgggg tctagaaaag gagttaatct gttttccctc ataaattcac     300
c                                                                     301


        <210> 304
        <211> 301
        <212> DNA
        <213> Homo sapien

        <400> 304 .
acatggatgt tattttgcag actgtcaacc tgaatttgta tttgcttgac attgcctaat      60
tattagtttc agtttcagct tacccacttt ttgtctgcaa catgcaraas agacagtgcc     120
cttttagtg tatcatatca ggaatcatct cacattggtt tgtgccatta ctggtgcagt     180
gactttcagc cacttgggta aggtggagtt ggccatatgt ctccactgca aaattactga     240
ttttcctttt gtaattaata agtgtgtgtg tgaagattct ttgagatgag gtatatatct     300
c                                                                     301


        <210> 305
        <211> 301
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(301)
        <223> n = A,T,C or G

        <400> 305
gangtacagc gtggtcaagg taacaagaag aaaaaaatgt gagtggcatc ctgggatgag      60
caggggaca gacctggaca gacacgttgt catttgctgc tgtgggtagg aaaatgggcg     120
taaaggagga gaaacagata caaaatctcc aactcagtat taaggtattc tcatgcctag     180
aatattggta gaaacaagaa tacattcata tggcaaataa ctaaccatgg tggaacaaaa     240
ttctgggatt taagttggat accaangaaa ttgtattaaa agagctgttc atggaataag     300
a                                                                     301


        <210> 306
        <211> 8
        <212> PRT
        <213> Homo sapien

        <400> 306
Val Leu Gly Trp Val Ala Glu Leu
```

92

```
        <210> 307
        <211> 637
        <212> DNA
        <213> Homo sapien

        <400> 307
acagggratg aagggaaagg gagaggatga ggaagccccc ctggggattt ggtttggtcc    60
ttgtgatcag gtggtctatg gggcttatcc ctacaaagaa gaatccagaa ataggggcac   120
attgaggaat gatacttgag cccaaagagc attcaatcat tgttttattt gccttmtttt   180
cacaccattg gtgagggagg gattaccacc ctggggttat gaagatggtt gaacacccca   240
cacatagcac cggagatatg agatcaacag tttcttagcc atagagattc acagcccaga   300
gcaggaggac gcttgcacac catgcaggat gacatggggg atgcgctcgg gattggtgtg   360
aagaagcaag gactgttaga ggcaggcttt atagtaacaa gacggtgggg caaactctga   420
tttccgtggg ggaatgtcat ggtcttgctt tactaagttt tgagactggc aggtagtgaa   480
actcattagg ctgagaacct tgtggaatgc acttgaccca sctgatagag gaagtagcca   540
ggtgggagcc tttcccagtg ggtgtgggac atatctggca agattttgtg gcactcctgg   600
ttacagatac tggggcagca aataaaactg aatcttg                            637

        <210> 308
        <211> 647
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(647)
        <223> n = A,T,C or G

        <400> 308
acgattttca ttatcatgta aatcgggtca ctcaaggggc caaccacagc tgggagccac    60
tgctcagggg aaggttcata tgggactttc tactgcccaa ggttctatac aggatataaa   120
ggngcctcac agtatagatc tggtagcaaa gaagaagaaa caaacactga tctctttctg   180
ccacccctct gaccctttgg aactcctctg acccttttaga acaagcctac ctaatatctg   240
ctagagaaaa gaccaacaac ggcctcaaag gatctcttac catgaaggtc tcagctaatt   300
cttggctaag atgtgggttc cacattaggt tctgaatatg gggggaaggg tcaatttgct   360
cattttgtgt gtggataaag tcaggatgcc caggggccag agcagggggc tgcttgcttt   420
gggaacaatg gctgagcata taaccatagg ttatggggaa caaaacaaca tcaaagtcac   480
tgtatcaatt gccatgaaga cttgagggac ctgaatctac cgattcatct taaggcagca   540
ggaccagttt gagtggcaac aatgcagcag cagaatcaat ggaaacaaca gaatgattgc   600
aatgtccttt tttttctcct gcttctgact tgataaaagg ggaccgt               647

        <210> 309
        <211> 460
        <212> DNA
        <213> Homo sapien

        <400> 309
actttatagt ttaggctgga cattggaaaa aaaaaaaagc cagaacaaca tgtgatagat    60
aatatgattg gctgcacact tccagactga tgaatgatga acgtgatgga ctattgtatg   120
gagcacatct tcagcaagag ggggaaatac tcatcatttt tggccagcag ttgtttgatc   180
accaaacatc atgccagaat actcagcaaa ccttcttagc tcttgagaag tcaaagtccg   240
ggggaattta ttcctggcaa ttttaattgg actccttatg tgagagcagc ggctacccag   300
ctggggtggt ggagcgaacc cgtcactagt ggacatgcag tggcagagct cctggtaacc   360
acctagagga atacacaggc acatgtgtga tgccaagcgt gacacctgta gcactcaaat   420
ttgtcttgtt tttgtctttc ggtgtgtaag attcttaagt                         460

        <210> 310
        <211> 539
        <212> DNA
        <213> Homo sapien
```

93

```
       <400> 310
acgggactta tcaaataaag ataggaaaag aagaaaactc aaatattata ggcagaaatg      60
ctaaaggttt taaaatatgt caggattgga agaaggcatg gataaagaac aaagttcagt     120
taggaaagag aaacacagaa ggaagagaca caataaaagt cattatgtat tctgtgagaa     180
gtcagacagt aagatttgtg ggaaatgggt tggtttgttg tatggtatgt attttagcaa     240
taatctttat ggcagagaaa gctaaaatcc tttagcttgc gtgaatgatc acttgctgaa     300
ttcctcaagg taggcatgat gaaggagggt ttagaggaga cacagacaca atgaactgac     360
ctagatagaa agccttagta tactcagcta ggaatagtga ttctgagggc acactgtgac     420
atgattatgt cattacatgt atggtagtga tggggatgat aggaaggaag aacttatggc     480
atattttcac ccccacaaaa gtcagttaaa tattgggaca ctaaccatcc aggtcaaga      539

       <210> 311
       <211> 526
       <212> DNA
       <213> Homo sapien

       <220>
       <221> misc_feature
       <222> (1)...(526)
       <223> n = A,T,C or G

       <400> 311
caaatttgag ccaatgacat agaattttac aaatcaagaa gcttattctg gggccatttc      60
ttttgacgtt ttctctaaac tactaaagag gcattaatga tccataaatt atattatcta     120
catttacagc atttaaaatg tgttcagcat gaaatattag ctacagggga agctaaataa     180
attaaacatg gaataaagat ttgtccttaa atataatcta caagaagact ttgatatttg     240
tttttcacaa gtgaagcatt cttataaagt gtcataacct ttttggggaa actatgggaa     300
aaaatgggga aactctgaag ggtttttaagt atcttacctg aagctacaga ctccataacc     360
tctctttaca gggagctcct gcagcccta cagaaatgag tggctgagat tcttgattgc     420
acagcaagag cttctcatct aaaccctttc cctttttagt atctgtgtat caagtataaa     480
agttctataa actgtagtnt acttatttta atccccaaag cacagt                    526

       <210> 312
       <211> 500
       <212> DNA
       <213> Homo sapien

       <220>
       <221> misc_feature
       <222> (1)...(500)
       <223> n = A,T,C or G

       <400> 312
cctctctctc cccaccccct gactctagag aactgggttt tctcccagta ctccagcaat      60
tcatttctga aagcagttga gccactttat tccaaagtac actgcagatg ttcaaactct     120
ccatttctct ttcccttcca cctgccagtt ttgctgactc tcaacttgtc atgagtgtaa     180
gcattaagga cattatgctt cttcgattct gaagacaggc cctgctcatg gatgactctg     240
gcttcttagg aaaatatttt tcttccaaaa tcagtaggaa atctaaactt atcccctctt     300
tgcagatgtc tagcagcttc agacatttgg ttaagaaccc atgggaaaaa aaaaaatcct     360
tgctaatgtg gtttcctttg taaaccanga ttcttatttg nctggtatag aatatcagct     420
ctgaacgtgt ggtaaagatt tttgtgtttg aatataggag aaatcagttt gctgaaaagt     480
tagtcttaat tatctattgg                                                 500

       <210> 313
       <211> 718
       <212> DNA
       <213> Homo sapien

       <220>
       <221> misc_feature
       <222> (1)...(718)
```

94

<400> 313
```
ggagatttgt gtggtttgca gccgagggag accaggaaga tctgcatggt gggaaggacc    60
tgatgataca gaggtgagaa ataagaaagg ctgctgactt taccatctga ggccacacat   120
ctgctgaaat ggagataatt aacatcacta gaaacagcaa gatgacaata taatgtctaa   180
gtagtgacat gtttttgcac atttccagcc cttttaaata tccacacaca caggaagcac   240
aaaaggaagc acagagatcc ctgggagaaa tgcccggccg ccatcttggg tcatcgatga   300
gcctcgccct gtgcctgntc ccgcttgtga gggaaggaca ttagaaaatg aattgatgtg   360
ttccttaaag gatggcagga aaacagatcc tgttgtggat atttatttga acgggattac   420
agatttgaaa tgaagtcaca aagtgagcat taccaatgag aggaaaacag acgagaaat    480
cttgatggtt cacaagacat gcaacaaaca aaatggaata ctgtgatgac acgagcagcc   540
aactggggag gagataccac ggggcagagg tcaggattct ggccctgctg cctaactgtg   600
cgttatacca atcatttcta tttctaccct caaacaagct gtngaatatc tgacttacgg   660
ttcttntggc ccacattttc atnatccacc ccntcntttt aannttantc caaantgt     718
```

<210> 314
<211> 358
<212> DNA
<213> Homo sapien

<400> 314
```
gtttatttac attacagaaa aaacatcaag acaatgtata ctatttcaaa tatatccata    60
cataatcaaa tatagctgta gtacatgttt tcattggtgt agattaccac aaatgcaagg   120
caacatgtgt agatctcttg tcttattctt ttgtctataa tactgtattg tgtagtccaa   180
gctctcggta gtccagccac tgtgaaacat gctcccttta gattaacctc gtggacgctc   240
ttgttgtatt gctgaactgt agtgccctgt attttgcttc tgtctgtgaa ttctgttgct   300
tctggggcat ttccttgtga tgcagaggac caccacacag atgacagcaa tctgaatt     358
```

<210> 315
<211> 341
<212> DNA
<213> Homo sapien

<400> 315
```
taccacctcc ccgctggcac tgatgagccg catcaccatg gtcaccagca ccatgaaggc    60
ataggtgatg atgaggacat ggaatgggcc cccaaggatg gtctgtccaa agaagcgagt   120
gacccccatt ctgaagatgt ctggaacctc taccagcagg atgatgatag ccccaatgac   180
agtcaccagc tccccgacca gccggatatc gtccttaggg gtcatgtagg cttcctgaag   240
tagcttctgc tgtaagaggg tgttgtcccg ggggctcgtg cggttattgg tcctgggctt   300
gaggggggcgg tagatgcagc acatggtgaa gcagatgatg t                       341
```

<210> 316
<211> 151
<212> DNA
<213> Homo sapien

<400> 316
```
agactgggca agactcttac gccccacact gcaatttggt cttgttgccg tatccattta    60
tgtgggcctt tctcgagttt ctgattataa acaccactgg agcgatgtgt tgactggact   120
cattcaggga gctctggttg caatattagt t                                  151
```

<210> 317
<211> 151
<212> DNA
<213> Homo sapien

<400> 317
```
agaactagtg gatcctaatg aaatacctga aacatatatt ggcatttatc aatggctcaa    60
atcttcattt atctctggcc ttaaccctgg ctcctgaggc tgcggccagc agatcccagg   120
ccagggctct gttcttgcca cacctgcttg a                                  151
```

95

```
<210> 318
<211> 151
<212> DNA
<213> Homo sapien

<400> 318
actggtggga ggcgctgttt agttggctgt tttcagaggg gtctttcgga gggacctcct        60
gctgcaggct ggagtgtctt tattcctggc gggagaccgc acattccact gctgaggctg       120
tggggcggt ttatcaggca gtgataaaca t                                        151

<210> 319
<211> 151
<212> DNA
<213> Homo sapien

<400> 319
aactagtgga tccagagcta taggtacagt gtgatctcag ctttgcaaac acattttcta        60
catagatagt actaggtatt aatagatatg taaagaaaga aatcacacca ttaataatgg       120
taagattggg tttatgtgat tttagtgggt a  .                                     151

<210> 320
<211> 150
<212> DNA
<213> Homo sapien

<400> 320
·aactagtgga tccactagtc cagtgtggtg gaattccatt gtgttggggt tctagatcgc        60
gagcggctgc cctttttttt ttttttttg ggggggaatt tttttttttt aatagttatt       120
gagtgttcta cagcttacag taaataccat                                         150

<210> 321
<211> 151
<212> DNA
<213> Homo sapien

<400> 321
agcaactttg tttttcatcc aggttatttt aggcttagga tttcctctca cactgcagtt        60
tagggtggca ttgtaaccag ctatggcata ggtgttaacc aaaggctgag taaacatggg       120
tgcctctgag aaatcaaagt cttcatacac t                                       151

<210> 322
<211> 151
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(151)
<223> n = A,T,C or G

<400> 322
atccagcatc ttctcctgtt tcttgccttc cttttcttc ttcttasatt ctgcttgagg        60
tttgggcttg gtcagtttgc cacagggctt ggagatggtg acagtcttct ggcattcggc       120
attgtgcagg gctcgcttca nacttccagt t                                       151

<210> 323
<211> 151
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
```

96

```
<222> (1)...(151)
<223> n = A,T,C or G

<400> 323
tgaggacttg tkttcttttt ctttattttt aatcctctta ckttgtaaat atattgccta      60
nagactcant tactacccag tttgtggttt twtgggagaa atgtaactgg acagttagct     120
gttcaatyaa aaagacactt ancccatgtg g                                    151

<210> 324
<211> 461
<212> DNA
<213> Homo sapien

<220>
<221> misc_feature
<222> (1)...(461)
<223> n = A,T,C or G

<400> 324
acctgtgtgg aatttcagct ttcctcatgc aaaaggattt tgtatccccg gcctacttga      60
agaagtggtc agctaaagga atccaggttg ttggttggac tgttaatacc tttgatgaaa     120
agagttacta cgaatcccat cttggttcca gctatatcac tgacagcatg gtagaagact     180
gcgaacctca cttctagact ttcacggtgg gacgaaacgg gttcagaaac tgccaggggc     240
ctcatacagg gatatcaaaa taccctttgt gctacccagg ccctggggaa tcaggtgact     300
cacacaaatg caatagttgg tcactgcatt tttacctgaa ccaaagctaa acccggtgtt     360
gccaccatgc accatggcat gccagagttc aacactgttg ctcttgaaaa ttgggtctga     420
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<210> 325
<211> 400
<212> DNA
<213> Homo sapien

<400> 325
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agtaagagtg gtggcctatt tcagctgctt tgacaaaatg actggctcct gacttaacgt     180
tctataaatg aatgtgctga agcaaagtgc ccatggtggc ggcgaagaag agaaagatgt     240
gtttttgtttt ggactctctg tggtcccttc caatgctgtg ggtttccaac caggggaagg     300
gtcccttttg cattgccaag tgccataacc atgagcacta cgctaccatg gttctgcctc     360
ctggccaagc aggctggttt gcaagaatga aatgaatgat                           400

<210> 326
<211> 1215
<212> DNA
<213> Homo sapien

<400> 326
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gaactcctac accatcgggc tgggcctgca cagtcttgag gccgaccaag agccagggag     180
ccagatggtg gaggccagcc tctccgtacg gcacccagag tacaacagac ccttgctcgc     240
taacgacctc atgctcatca agttggacga atccgtgtcc gagtctgaca ccatccggag     300
catcagcatt gcttcgcagt gccctaccgc ggggaactct tgcctcgttt ctggctgggg     360
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cggagggcaa gaccagaagg actcctgcaa cggtgactct ggggggcccc tgatctgcaa     540
cgggtacttg cagggccttg tgtctttcgg aaaagccccg tgtggccaag ttggcgtgcc     600
aggtgtctac accaacctct gcaaattcac tgagtggata gagaaaaccg tccaggccag     660
ttaactctgg ggactgggaa cccatgaaat tgacccccaa atacatcctg cggaaggaat     720
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cctccctcag actcagaggt ccaagccccc aaccctcct tccccagacc cagaggtcca     1020
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acagtgcccc cttgtggcac gttgacccaa ccttaccagt tggttttttca ttttttgtcc     1140
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aaaaaaaaa aaaaa                                                      1215
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        <210> 327
        <211> 220
        <212> PRT
        <213> Homo sapien


        <400> 327
Glu Asp Cys Ser Pro His Ser Gln Pro Trp Gln Ala Ala Leu Val Met
1               5                   10                  15
Glu Asn Glu Leu Phe Cys Ser Gly Val Leu Val His Pro Gln Trp Val
            20                  25                  30
Leu Ser Ala Ala His Cys Phe Gln Asn Ser Tyr Thr Ile Gly Leu Gly
        35                  40                  45
Leu His Ser Leu Glu Ala Asp Gln Glu Pro Gly Ser Gln Met Val Glu
    50                  55                  60
Ala Ser Leu Ser Val Arg His Pro Glu Tyr Asn Arg Pro Leu Leu Ala
65                  70                  75                  80
Asn Asp Leu Met Leu Ile Lys Leu Asp Glu Ser Val Ser Glu Ser Asp
                85                  90                  95
Thr Ile Arg Ser Ile Ser Ile Ala Ser Gln Cys Pro Thr Ala Gly Asn
            100                 105                 110
Ser Cys Leu Val Ser Gly Trp Gly Leu Leu Ala Asn Gly Arg Met Pro
        115                 120                 125
Thr Val Leu Gln Cys Val Asn Val Ser Val Val Ser Glu Glu Val Cys
    130                 135                 140
Ser Lys Leu Tyr Asp Pro Leu Tyr His Pro Ser Met Phe Cys Ala Gly
145                 150                 155                 160
Gly Gly Gln Asp Gln Lys Asp Ser Cys Asn Gly Asp Ser Gly Gly Pro
                165                 170                 175
Leu Ile Cys Asn Gly Tyr Leu Gln Gly Leu Val Ser Phe Gly Lys Ala
                180                 185                 190
Pro Cys Gly Gln Val Gly Val Pro Gly Val Tyr Thr Asn Leu Cys Lys
        195                 200                 205
Phe Thr Glu Trp Ile Glu Lys Thr Val Gln Ala Ser
    210                 215                 220


        <210> 328
        <211> 234
        <212> DNA
        <213> Homo sapien


        <400> 328
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agccctggca ggcggcactg tcatggaaa acgaattgtt ctgctcgggc gtcctggtgc      120
atccgcagtg ggtgctgtca gccacacact gtttccagaa ctcctacacc atcgggctgg      180
gcctgcacag tcttgaggcc gaccaagagc cagggagcca gatggtggag gcca           234


        <210> 329
        <211> 77
        <212> PRT
        <213> Homo sapien


        <400> 329
Leu Val Ser Gly Ser Cys Ser Gln Ile Ile Asn Gly Glu Asp Cys Ser
1               5                   10                  15
```

```
Pro His Ser Gln Pro Trp Gln Ala Ala Leu Val Met Glu Asn Glu Leu
        20              25                  30
Phe Cys Ser Gly Val Leu Val His Pro Gln Trp Val Leu Ser Ala Thr
        35              40                  45
His Cys Phe Gln Asn Ser Tyr Thr Ile Gly Leu Gly Leu His Ser Leu
    50              55                  60
Glu Ala Asp Gln Glu Pro Gly Ser Gln Met Val Glu Ala
65              70              75
```

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        <210> 330
        <211> 70
        <212> DNA
        <213> Homo sapien

        <400> 330
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gctgcagcca                                                           70


        <210> 331
        <211> 22
        <212> PRT
        <213> Homo sapien

        <400> 331
Gln His Asn Gly Pro Ile Pro Ser Leu Thr Pro Pro Ser Gly Ser Leu
1               5               10                  15
Val Ser Gly Ser Cys Ser
            20


        <210> 332
        <211> 2507
        <212> DNA
        <213> Homo sapien

        <400> 332
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gtacatcaac tgttcagctt cctgggaaag tagttgtggt cacaggagct aatacaggta   180
tcgggaagga gacagccaaa gagctggctc agagaggagc tcgagtatat ttagcttgcc   240
gggatgtgga aaagggggaa ttggtggcca aagagatcca gaccacgaca gggaaccagc   300
aggtgttggt gcggaaactg gacctgtctg atactaagtc tattcgagct tttgctaagg   360
gcttcttagc tgaggaaaag cacctccacg ttttgatcaa caatgcagga gtgatgatgt   420
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aacccacct ctactaaaaa ttgtgtatat ctttgtgtgt cttcctgttt atgtgtgcca  1560
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99

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        <210> 333
        <211> 3030
        <212> DNA
        <213> Homo sapien

        <400> 333
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gctccatgga gcccggcaat tatgccacct tggatggagc caaggatatc gaaggcttgc        180
tgggagcggg agggggggcgg aatctggtcg cccactcccc tctgaccagc cacccagcgg       240
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cgccaaagca atgccaccca tgccctgggg tgccccaggg gacgtcccca gctcccgtgc        360
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        <210> 334
        <211> 2417
        <212> DNA
        <213> Homo sapien

        <400> 334
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        <210> 335
        <211> 2984

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<212> DNA
<213> Homo sapien

<400> 335
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aaactagcaa ctcttatttc tttcctttaa aaatacatag cattaaatcc caaatcctat        1680
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gctgttacgt ttgaagtctg acaatccttg agaatctttg catgcagagg aggtaagagg        1800
tattggattt tcacagagga agaacacagc gcagaatgaa gggccaggct tactgagctg        1860
tccagtggag ggctcatggg tgggacatgg aaaagaaggc agcctaggcc ctggggagcc        1920
cagtccactg agcaagcaag ggactgagtg agcctttgc aggaaaaggc taagaaaaag         1980
gaaaaccatt ctaaaacaca acaagaaact gtccaaatgc tttgggaact gtgtttattg        2040
cctataatgg gtccccaaaa tgggtaacct agacttcaga gagaatgagc agagagcaaa        2100
ggagaaatct ggctgtcctt ccattttcat tctgttatct caggtgagct ggtagagggg        2160
agacattaga aaaaaatgaa acaacaaaac aattactaat gaggtacgct gaggcctggg        2220
agtctcttga ctccactact taattccgtt tagtgagaaa cctttcaatt ttcttttatt        2280
agaagggcca gcttactgtt ggtggcaaaa ttgccaacat aagttaatag aaagttggcc        2340
aatttcaccc cattttctgt ggtttgggct ccacattgca atgttcaatg ccacgtgctg        2400
ctgacaccga ccggagtact agccagcaca aaaggcaggg tagcctgaat tgcctttctgc       2460
tctttacatt tcttttaaaa taagcattta gtgctcagtc cctactgagt actctttctc        2520
tcccctcctc tgaatttaat tctttcaact tgcaatttgc aaggattaca catttcactg        2580
tgatgtatat tgtgttgcaa aaaaaaaaaa aagtgtcttt gtttaaaatt acttggtttg        2640
tgaatccatc ttgctttttc cccattggaa ctagtcatta acccatctct gaactggtag        2700
aaaaacatct gaagagctag tctatcagca tctgacaggt gaattggatg gttctcagaa        2760
ccatttcacc cagacagcct gtttctatcc tgtttaataa attagtttgg gttctctaca        2820
tgcataacaa accctgctcc aatctgtcac ataaaagtct gtgacttgaa gtttagtcag        2880
cacccccacc aaactttatt tttctatgtg ttttttgcaa catatgagtg ttttgaaaat        2940
aaagtaccca tgtctttatt agaaaaaaaa aaaaaaaaaa aaaa                          2984
```

```
<210> 336
<211> 147
<212> PRT
<213> Homo sapien

<400> 336
Pro Ser Phe Pro Thr Leu Leu Ser Arg Arg His Leu Gly Ser Tyr Leu
```

102

```
     1                   5                   10                  15
Leu Asp Ser Glu Asn Thr Ser Gly Ala Leu Pro Arg Leu Pro Gln Thr
             20                  25                  30
Pro Lys Gln Pro Gln Lys Arg Ser Arg Ala Ala Phe Ser His Thr Gln
             35                  40                  45
Val Ile Glu Leu Glu Arg Lys Phe Ser His Gln Lys Tyr Leu Ser Ala
         50                  55                  60
Pro Glu Arg Ala His Leu Ala Lys Asn Leu Lys Leu Thr Glu Thr Gln
65                   70                  75                  80
Val Lys Ile Trp Phe Gln Asn Arg Arg Tyr Lys Thr Lys Arg Lys Gln
                 85                  90                  95
Leu Ser Ser Glu Leu Gly Asp Leu Glu Lys His Ser Ser Leu Pro Ala
             100                 105                 110
Leu Lys Glu Glu Ala Phe Ser Arg Ala Ser Leu Val Ser Val Tyr Asn
         115                 120                 125
Ser Tyr Pro Tyr Tyr Pro Tyr Leu Tyr Cys Val Gly Ser Trp Ser Pro
     130                 135                 140
Ala Phe Trp
145


        <210> 337
        <211> 9
        <212> PRT
        <213> Homo sapien


        <400> 337
Ala Leu Thr Gly Phe Thr Phe Ser Ala
 1               5


        <210> 338
        <211> 9
        <212> PRT
        <213> Homo sapien


        <400> 338
Leu Leu Ala Asn Asp Leu Met Leu Ile
 1               5


        <210> 339
        <211> 318
        <212> PRT
        <213> Homo sapien


        <400> 339
Met Val Glu Leu Met Phe Pro Leu Leu Leu Leu Leu Leu Pro Phe Leu
 1               5                   10                  15
Leu Tyr Met Ala Ala Pro Gln Ile Arg Lys Met Leu Ser Ser Gly Val
             20                  25                  30
Cys Thr Ser Thr Val Gln Leu Pro Gly Lys Val Val Val Val Thr Gly
             35                  40                  45
Ala Asn Thr Gly Ile Gly Lys Glu Thr Ala Lys Glu Leu Ala Gln Arg
         50                  55                  60
Gly Ala Arg Val Tyr Leu Ala Cys Arg Asp Val Glu Lys Gly Glu Leu
65                   70                  75                  80
Val Ala Lys Glu Ile Gln Thr Thr Thr Gly Asn Gln Gln Val Leu Val
                 85                  90                  95
Arg Lys Leu Asp Leu Ser Asp Thr Lys Ser Ile Arg Ala Phe Ala Lys
             100                 105                 110
Gly Phe Leu Ala Glu Glu Lys His Leu His Val Leu Ile Asn Asn Ala
         115                 120                 125
Gly Val Met Met Cys Pro Tyr Ser Lys Thr Ala Asp Gly Phe Glu Met
```

```
     130                135                140
His Ile Gly Val Asn His Leu Gly His Phe Leu Leu Thr His Leu Leu
145                    150                155                160
Leu Glu Lys Leu Lys Glu Ser Ala Pro Ser Arg Ile Val Asn Val Ser
             165                170                175
Ser Leu Ala His His Leu Gly Arg Ile His Phe His Asn Leu Gln Gly
         180                185                190
Glu Lys Phe Tyr Asn Ala Gly Leu Ala Tyr Cys His Ser Lys Leu Ala
         195                200                205
Asn Ile Leu Phe Thr Gln Glu Leu Ala Arg Arg Leu Lys Gly Ser Gly
     210                215                220
Val Thr Thr Tyr Ser Val His Pro Gly Thr Val Gln Ser Glu Leu Val
225                    230                235                240
Arg His Ser Ser Phe Met Arg Trp Met Trp Trp Leu Phe Ser Phe Phe
             245                250                255
Ile Lys Thr Pro Gln Gln Gly Ala Gln Thr Ser Leu His Cys Ala Leu
         260                265                270
Thr Glu Gly Leu Glu Ile Leu Ser Gly Asn His Phe Ser Asp Cys His
         275                280                285
Val Ala Trp Val Ser Ala Gln Ala Arg Asn Glu Thr Ile Ala Arg Arg
     290                295                300
Leu Trp Asp Val Ser Cys Asp Leu Leu Gly Leu Pro Ile Asp
305                310                315
```

        <210> 340
        <211> 483
        <212> DNA
        <213> Homo sapien

        <400> 340
```
gccgaggtct gccttcacac ggaggacacg agactgcttc ctcaagggct cctgcctgcc    60
tggacactgg tgggaggcgc tgtttagttg gctgttttca gaggggtctt tcggagggac   120
ctcctgctgc aggctggagt gtctttattc ctggcgggag accgcacatt ccactgctga   180
ggttgtgggg gcggtttatc aggcagtgat aaacataaga tgtcatttcc ttgactccgg   240
ccttcaattt tctctttggc tgacgacgga gtccgtggtg tcccgatgta actgaccct    300
gctccaaacg tgacatcact gatgctcttc tcgggggtgc tgatggcccg cttggtcacg   360
tgctcaatct cgccattcga ctcttgctcc aaactgtatg aagacacctg actgcacgtt   420
ttttctgggc ttccagaatt taaagtgaaa ggcagcactc ctaagctccg actccgatgc   480
ctg                                                                 483
```

        <210> 341
        <211> 344
        <212> DNA
        <213> Homo sapien

        <400> 341
```
ctgctgctga gtcacagatt tcattataaa tagcctccct aaggaaaata cactgaatgc    60
tatttttact aaccattcta tttttataga aatagctgag agtttctaaa ccaactctct   120
gctgccttac aagtattaaa tatttttactt ctttccataa agagtagctc aaaatatgca   180
attaatttaa taatttctga tgatggtttt atctgcagta atatgtatat catctattag   240
aatttactta atgaaaaact gaagagaaca aaatttgtaa ccactagcac ttaagtactc   300
ctgattctta acattgtctt taatgaccac aagacaacca acag                    344
```

        <210> 342
        <211> 592
        <212> DNA
        <213> Homo sapien

        <400> 342
```
acagcaaaaa agaaactgag aagcccaaty tgctttcttg ttaacatcca cttatccaac    60
caatgtggaa acttcttata cttggttcca ttatgaagtt ggacaattgc tgctatcaca   120
cctggcaggt aaaccaatgc caagagagtg atggaaacca ttggcaagac tttgttgatg   180
```

104

```
accaggattg gaattttata aaaatattgt tgatgggaag ttgctaaagg gtgaattact    240
tccctcagaa gagtgtaaag aaaagtcaga gatgctataa tagcagctat tttaattggc    300
aagtgccact gtggaaagag ttcctgtgtg tgctgaagtt ctgaagggca gtcaaattca    360
tcagcatggg ctgtttggtg caaatgcaaa agcacaggtc tttttagcat gctggtctct    420
cccgtgtcct tatgcaaata atcgtcttct tctaaatttc tcctaggctt cattttccaa    480
agttcttctt ggtttgtgat gtcttttctg ctttccatta attctataaa atagtatggc    540
ttcagccacc cactcttcgc cttagcttga ccgtgagtct cggctgccgc tg            592
```

```
        <210> 343
        <211> 382
        <212> DNA
        <213> Homo sapien


        <400> 343
ttcttgacct cctcctcctt caagctcaaa caccacctcc cttattcagg accggcactt    60
cttaatgttt gtggctttct ctccagcctc tcttaggagg ggtaatggtg gagttggcat    120
cttgtaactc tccttttctcc tttcttcccc tttctctgcc cgcctttccc atcctgctgt    180
agacttcttg attgtcagtc tgtgtcacat ccagtgattg ttttggtttc tgttcccttt    240
ctgactgccc aaggggctca gaaccccagc aatcccttcc tttcactacc ttcttttttg    300
ggggtagttg gaagggactg aaattgtggg gggaaggtag gaggcacatc aataaagagg    360
aaaccaccaa gctgaaaaaa aa                                             382
```

```
        <210> 344
        <211> 536
        <212> DNA
        <213> Homo sapien


        <400> 344
ctgggcctga agctgtaggg taaatcagag gcaggcttct gagtgatgag agtcctgaga    60
caataggcca cataaacttg gctggatgga acctcacaat aaggtggtca cctcttgttt    120
gtttaggggg atgccaagga taaggccagc tcagttatat gaagagaagc agaacaaaca    180
agtctttcag agaaatggat gcaatcagag tgggatcccg gtcacatcaa ggtcacactc    240
caccttcatg tgcctgaatg gttgccaggt cagaaaaatc caccccttac gagtgcggct    300
tcgaccctat atcccccgcc cgcgtccctt tctccataaa attcttctta gtagctatta    360
ccttcttatt atttgatcta gaaattgccc tccttttacc cctaccatga gccctacaaa    420
caactaacct gccactaata gttatgtcat ccctcttatt aatcatcatc ctagccctaa    480
gtctggccta tgagtgacta caaaaaggat tagactgagc cgaataacaa aaaaaa        536
```

```
        <210> 345
        <211> 251
        <212> DNA
        <213> Homo sapien


        <400> 345
acctttgag gtctctctca ccacctccac agccaccgtc accgtgggat gtgctggatg    60
tgaatgaagc ccccatcttt gtgcctcctg aaaagagagt ggaagtgtcc gaggactttg    120
gcgtgggcca ggaaatcaca tcctacactg cccaggagcc agacacattt atggaacaga    180
aaataacata tcggatttgg agagacactg ccaactggct ggagattaat ccggacactg    240
gtgccatttc c                                                         251
```

```
        <210> 346
        <211> 282
        <212> DNA
        <213> Homo sapien


        <220>
        <221> misc_feature
        <222> (1)...(282)
        <223> n = A,T,C or G

<400> 346
cgcgtctctg acactgtgat catgacaggg gttcaaacag aaagtgcctg ggccctcctt    60
```

```
ctaagtcttg ttaccaaaaa aaggaaaaag aaaagatctt ctcagttaca aattctggga    120
agggagacta tacctggctc ttgccctaag tgagaggtct tccctcccgc accaaaaaat    180
agaaaggctt tctatttcac tggcccaggt agggggaagg agagtaactt tgagtctgtg    240
ggtctcattt cccaaggtgc cttcaatgct catnaaaacc aa                      282
```

          <210> 347
          <211> 201
          <212> DNA
          <213> Homo sapien

          <220>
          <221> misc_feature
          <222> (1)...(201)
          <223> n = A,T,C or G

          <400> 347
```
acacacataa tattataaaa tgccatctaa ttggaaggag ctttctatca ttgcaagtca     60
taaatataac ttttaaaana ntactancag cttttaccta ngctcctaaa tgcttgtaaa    120
tctgagactg actggaccca cccagaccca gggcaaagat acatgttacc atatcatctt    180
tataaagaat tttttttgt c                                               201
```

          <210> 348
          <211> 251
          <212> DNA
          <213> Homo sapien

          <400> 348
```
ctgttaatca caacatttgt gcatcacttg tgccaagtga gaaaatgttc taaaatcaca     60
agagagaaca gtgccagaat gaaactgacc ctaagtccca ggtgcccctg ggcaggcaga    120
aggagacact cccagcatgg aggagggttt atcttttcat cctaggtcag gtctacaatg    180
ggggaaggtt ttattataga actcccaaca gcccacctca ctcctgccac ccacccgatg    240
gccctgcctc c                                                        251
```

          <210> 349
          <211> 251
          <212> DNA
          <213> Homo sapien

          <400> 349
```
taaaaatcaa gccatttaat tgtatctttg aaggtaaaca atatatggga gctggatcac     60
aacccctgag gatgccagag ctatgggtcc agaacatggt gtggtattat caacagagtt    120
cagaagggtc tgaactctac gtgttaccag agaacataat gcaattcatg cattccactt    180
agcaattttg taaaatacca gaaacagacc ccaagagtct ttcaagatga ggaaaattca    240
actcctggtt t                                                        251
```

          <210> 350
          <211> 908
          <212> DNA
          <213> Homo sapien

          <400> 350
```
ctggacactt tgcgagggct tttgctggct gctgctgctg cccgtcatgc tactcatcgt     60
agcccgcccg gtgaagctcg ctgctttccc tacctcctta agtgactgcc aaacgcccac    120
cggctggaat tgctctggtt atgatgacag agaaaatgat ctcttcctct gtgacaccaa    180
cacctgtaaa tttgatgggg aatgtttaag aattggagac actgtgactt gcgtctgtca    240
gttcaagtgc aacaatgact atgtgcctgt gtgtggctcc aatggggaga gctaccagaa    300
tgagtgttac ctgcgacagg ctgcatgcaa acagcagagt gagatacttg tggtgtcaga    360
aggatcatgt gccacagtcc atgaaggctc tggagaaact agtcaaaagg agacatccac    420
ctgtgatatt tgccagtttg gtgcagaatg tgacgaagat gccgaggatg tctggtgtgt    480
gtgtaatatt gactgttctc aaaccaactt caatcccctc tgcgcttctg atgggaaatc    540
ttatgataat gcatgccaaa tcaaagaagc atcgtgtcag aaacaggaga aaattgaagt    600
catgtctttg ggtcgatgtc aagataacac aactacaact actaagtctg aagatgggca    660
```

106

```
ttatgcaaga acagattatg cagagaatgc taacaaatta gaagaaagtg ccagagaaca    720
ccacatacct tgtccggaac attacaatgg cttctgcatg catgggaagt gtgagcattc    780
tatcaatatg caggagccat cttgcaggtg tgatgctggt tatactggac aacactgtga    840
aaaaaaggac tacagtgttc tatacgttgt tcccggtcct gtacgatttc agtatgtctt    900
aatcgcag                                                            908
```

        <210> 351
        <211> 472
        <212> DNA
        <213> Homo sapien

        <400> 351
```
ccagttattt gcaagtggta agagcctatt taccataaat aatactaaga accaactcaa    60
gtcaaacctt aatgccattg ttattgtgaa ttaggattaa gtagtaattt tcaaaattca   120
cattaacttg attttaaaat cagwtttgyg agtcatttac cacaagctaa atgtgtacac   180
tatgataaaa acaaccattg tattcctgtt tttctaaaca gtcctaattt ctaacactgt   240
atatatcctt cgacatcaat gaactttgtt ttcttttact ccagtaataa agtaggcaca   300
gatctgtcca caacaaactt gccctctcat gccttgcctc tcaccatgct ctgctccagg   360
tcagcccccct tttggcctgt ttgttttgtc aaaaacctaa tctgcttctt gcttttcttg   420
gtaatatata tttagggaag atgttgcttt gcccacacac gaagcaaagt aa           472
```

        <210> 352
        <211> 251
        <212> DNA
        <213> Homo sapien

        <400> 352
```
ctcaaagcta atctctcggg aatcaaacca gaaaagggca aggatcttag gcatggtgga    60
tgtggataag gccaggtcaa tggctgcaag catgcagaga aagaggtaca tcggagcgtg   120
caggctgcgt tccgtcctta cgatgaagac cacgatgcag tttccaaaca ttgccactac   180
atacatggaa aggaggggga agccaaccca gaaatgggct ttctctaatc ctgggatacc   240
aataagcaca a                                                        251
```

        <210> 353
        <211> 436
        <212> DNA
        <213> Homo sapien

        <400> 353
```
tttttttttt tttttttttt tttttacaa caatgcagtc atttatttat tgagtatgtg    60
cacattatgg tattattact atactgatta tatttatcat gtgacttcta attaraaaat   120
gtatccaaaa gcaaaacagc agatatacaa aattaaagag acagaagata gacattaaca   180
gataaggcaa cttatacatt gacaatccaa atccaataca tttaaacatt tgggaaatga   240
gggggacaaa tggaagccar atcaaatttg tgtaaaacta ttcagtatgt ttcccttgct   300
tcatgtctga raaggctctc ccttcaatgg ggatgacaaa ctccaaatgc cacacaaatg   360
ttaacagaat actagattca cactggaacg ggggtaaaga agaaattatt ttctataaaa   420
gggctcctaa tgtagt                                                   436
```

        <210> 354
        <211> 854
        <212> DNA
        <213> Homo sapien

        <400> 354
```
cctttttctag ttcaccagtt ttctgcaagg atgctggtta gggagtgtct gcaggaggag    60
caagtctgaa accaaatcta ggaaacatag gaaacgagcc aggcacaggg ctggtgggcc   120
atcagggacc acccttgggg ttgatatttt gcttaatctg catcttttga gtaagatcat   180
ctgcagtag aagctgttct ccaggtacat ttctctagct catgtacaaa aacatcctga   240
aggactttgt caggtgcctt gctaaaagcc agatgcgttc ggcacttcct tggtctgagg   300
ttaattgcac acctacaggc actgggctca tgctttcaag tattttgtcc tcactttagg   360
gtgagtgaaa gatccccatt ataggagcac ttgggagaga tcatataaaa gctgactctt   420
gagtacatgc agtaatgggg tagatgtgtg tggtgtgtct tcattcctgc aagggtgctt   480
```

```
gttagggagt gtttccagga ggaacaagtc tgaaaccaat catgaaataa atggtaggtg      540
tgaactggaa aactaattca aaagagagat cgtgatatca gtgtggttga tacaccttgg      600
caatatggaa ggctctaatt tgcccatatt tgaaataata attcagcttt ttgtaataca      660
aaataacaaa ggattgagaa tcatggtgtc taatgtataa aagacccagg aaacataaat      720
atatcaactg cataaatgta aaatgcatgt gacccaagaa ggccccaaag tggcagacaa      780
cattgtaccc attttccctt ccaaaatgtg agcggcgggc ctgctgcttt caaggctgtc      840
acacgggatg tcag                                                       854
```

        <210> 355
        <211> 676
        <212> DNA
        <213> Homo sapien

        <400> 355
```
gaaattaagt atgagctaaa ttccctgtta aaacctctag gggtgacaga tctcttcaac       60
caggtcaaag ctgatctttc tggaatgtca ccaaccaagg gcctatattt atcaaaagcc      120
atccacaagt catacctgga tgtcagcgaa gagggcacgg aggcagcagc agccactggg      180
gacagcatcg ctgtaaaaag cctaccaatg agagctcagt tcaaggcgaa ccaccccttc      240
ctgttcttta taaggcacac tcataccaac acgatcctat tctgtggcaa gcttgcctct      300
ccctaatcag atggggttga gtaaggctca gagttgcaga tgaggtgcag agacaatcct      360
gtgactttcc cacggccaaa aagctgttca cacctcacgc acctctgtgc ctcagtttgc      420
tcatctgcaa aataggtcta ggatttcttc caaccatttc atgagttgtg aagctaaggc      480
tttgttaatc atggaaaaag gtagacttat gcagaaagcc tttctggctt tcttatctgt      540
ggtgtctcat ttgagtgctg tccagtgaca tgatcaagtc aatgagtaaa attttaaggg      600
attagatttt cttgacttgt atgtatctgt gagatcttga ataagtgacc tgacatctct      660
gcttaaagaa aaccag                                                     676
```

        <210> 356
        <211> 574
        <212> DNA
        <213> Homo sapien

        <400> 356
```
tttttttttt tttttcagga aaacattctc ttactttatt tgcatctcag caaaggttct       60
catgtggcac ctgactggca tcaaaccaaa gttcgtaggc caacaaagat gggccactca      120
caagcttccc atttgtagat ctcagtgcct atgagtatct gacacctgtt cctctcttca      180
gtctcttagg gaggcttaaa tctgtctcag gtgtgctaag agtgccagcc caaggkggtc      240
aaaagtccac aaaactgcag tctttgctgg gatagtaagc caagcagtgc ctggacagca      300
gagttctttt cttgggcaac agataaccag acaggactct aatcgtgctc ttattcaaca      360
ttcttctgtc tctgcctaga ctggaataaa aagccaatct ctctcgtggc acagggaagg      420
agatacaagc tcgtttacat gtgatagatc taacaaaggc atctaccgaa gtctggtctg      480
gatagacggc acagggagct cttaggtcag cgctgctggt tggaggacat tcctgagtcc      540
agctttgcag cctttgtgca acagtacttt ccca                                 574
```

        <210> 357
        <211> 393
        <212> DNA
        <213> Homo sapien

        <400> 357
```
tttttttttt tttttttttt tttttttttt tacagaatat aratgcttta tcactgkact       60
taatatggkg kcttgttcac tatacttaaa aatgcaccac tcataaatat ttaattcagc      120
aagccacaac caaracttga ttttatcaac aaaaacccct aaatataaac ggsaaaaaag      180
atagatataa ttattccagt tttttaaaa cttaaaarat attccattgc cgaattaara      240
araarataag tgttatatgg aaagaagggc attcaagcac actaaaraaa cctgaggkaa      300
gcataatctg tacaaaatta aactgtcctt tttggcattt taacaaattt gcaacgktct      360
tttttttctt tttctgtttt tttttttttt tac                                  393
```

        <210> 358
        <211> 630
        <212> DNA
        <213> Homo sapien

108

```
    <400> 358
acagggtaaa caggaggatc cttgctctca cggagcttac attctagcag gaggacaata        60
ttaatgttta taggaaaatg atgagtttat gacaaaggaa gtagatagtg ttttacaaga       120
gcatagagta gggaagctaa tccagcacag ggaggtcaca gagacatccc taaggaagtg       180
gagtttaaac tgagagaagc aagtgcttaa actgaaggat gtgttgaaga agaagggaga       240
gtagaacaat ttgggcagag ggaaccttat agaccctaag gtgggaaggt tcaaagaact       300
gaaagagagc tagaacagct ggagccgttc tccggtgtaa agaggagtca aagagataag       360
attaaagatg tgaagattaa gatcttggtg gcattcaggg attggcactt ctacaagaaa       420
tcactgaagg gagtaatgtg acattacttt tcacttcagg atggccattc taactccagg       480
gggtagactg gactaggtaa gactggaggc aggtagacct cttctaaggc ctgcgatagt       540
gaaagacaaa aataagtggg gaaattcagg ggatagtgaa aatcagtagg acttaatgag       600
caagccagag gttcctccac aacaaccagt                                        630

    <210> 359
    <211> 620
    <212> DNA
    <213> Homo sapien

    <400> 359
acagcattcc aaaatataca tctagagact aarrgtaaat gctctatagt gaagaagtaa        60
taattaaaaa atgctactaa tatagaaaat ttataatcag aaaataaat attcagggag        120
ctcaccagaa gaataaagtg ctctgccagt tattaaagga ttactgctgg tgaattaaat       180
atggcattcc ccaagggaaa tagagagatt cttctggatt atgttcaata tttatttcac       240
aggattaact gttttaggaa cagatataaa gcttcgccac ggaagagatg gacaaagcac       300
aaagacaaca tgatacctta ggaagcaaca ctacccttc aggcataaaa tttggagaaa        360
tgcaacatta tgcttcatga ataatatgta gaaagaaggt ctgatgaaaa tgacatcctt       420
aatgtaagat aactttataa gaattctggg tcaaataaaa ttctttgaag aaaacatcca       480
aatgtcattg acttatcaaa tactatcttg gcatataacc tatgaaggca aaactaaaca       540
aacaaaaagc tcacaccaaa caaaaccatc aacttatttt gtattctata acatacgaga       600
ctgtaaagat gtgacagtgt                                                   620

    <210> 360
    <211> 431
    <212> DNA
    <213> Homo sapien

    <400> 360
aaaaaaaaaa agccagaaca acatgtgata gataatatga ttggctgcac acttccagac        60
tgatgaatga tgaacgtgat ggactattgt atggagcaca tcttcagcaa gagggggaaa       120
tactcatcat ttttggccag cagttgtttg atcaccaaac atcatgccag aatactcagc       180
aaaccttctt agctcttgag aagtcaaagt ccggggggaat ttattcctgg caattttaat      240
tggactcctt atgtgagagc agcggctacc cagctggggt ggtggagcga acccgtcact       300
agtggacatg cagtggcaga gctcctggta accacctaga ggaatacaca ggcacatgtg       360
tgatgccaag cgtgacacct gtagcactca aatttgtctt gttttttgtct ttcggtgtgt      420
agattcttag t                                                           431

    <210> 361
    <211> 351
    <212> DNA
    <213> Homo sapien

    <400> 361
acactgattt ccgatcaaaa gaatcatcat ctttaccttg actttttcagg gaattactga       60
actttcttct cagaagatag ggcacagcca ttgccttggc ctcacttgaa gggtctgcat       120
ttgggtcctc tggtctcttg ccaagtttcc cagccactcg agggagaaat atcgggaggt       180
ttgacttcct ccggggcttt cccgagggct tcaccgtgag ccctgcggcc ctcaggctg        240
caatcctgga ttcaatgtct gaaacctcgc tctctgcctg ctggacttct gaggccgtca       300
ctgccactct gtcctccagc tctgacagct cctcatctgt ggtcctgttg t               351

    <210> 362
    <211> 463
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        <212> DNA
        <213> Homo sapien

        <400> 362
acttcatcag gccataatgg gtgcctcccg tgagaatcca agcacctttg gactgcgcga        60
tgtagatgag ccggctgaag atcttgcgca tgcgcggctt cagggcgaag ttcttggcgc       120
ccccggtcac agaaatgacc aggttgggtg ttttcaggtg ccagtgctgg gtcagcagct       180
cgtaaaggat ttccgcgtcc gtgtcgcagg acagacgtat atacttccct ttcttcccca       240
gtgtctcaaa ctgaatatcc ccaaaggcgt cggtaggaaa ttccttggtg tgtttcttgt       300
agttccattt ctcactttgg ttgatctggg tgccttccat gtgctggctc tgggcatagc       360
cacacttgca cacattctcc ctgataagca cgatggtgtg gacaggaagg aaggatttca       420
ttgagcctgc ttatggaaac tggtattgtt agcttaaata gac                        463

        <210> 363
        <211> 653
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(653)
        <223> n = A,T,C or G

        <400> 363
acccccgagt ncctgnctgg catactgnga acgaccaacg acacacccaa gctcggcctc        60
ctcttggnga ttctgggtga catcttcatg aatggcaacc gtgccagwga ggctgtcctc       120
tgggaggcac tacgcaagat gggactgcgt cctggggtga gacatcctct ccttggagat       180
ctaacgaaac ttctcaccta tgagttgtaa agcagaaata cctgnactac agacgagtgc       240
ccaacagcaa ccccccggaa gtatgagttc ctctrgggcc tccgttccta ccatgagasc       300
tagcaagatg naagtgttga gantcattgc agaggttcag aaaagagacc cntcgtgact       360
ggtctgcaca gttcatggag gctgcagatg aggccttgga tgctctggat gctgctgcag       420
ctgaggccga agcccgggct gaagcaagaa cccgcatgga aattggagat gaggctgtgt       480
ntgggccctg gagctgggat gacattgagt ttgagctgct gacctgggat gaggaaggag       540
attttggaga tccntggtcc agaattccat ttaccttctg ggccagatac caccagaatg       600
cccgctccag attccctcag accttgccg gtcccattat tggtcstggt ggt               653

        <210> 364
        <211> 401
        <212> DNA
        <213> Homo sapien

        <400> 364
actagaggaa agacgttaaa ccactctact accacttgtg gaactctcaa agggtaaatg        60
acaaagccaa tgaatgactc taaaaacaat atttacattt aatggtttgt agacaataaa       120
aaaacaaggt ggatagatct agaattgtaa cattttaaga aaaccatagc atttgacaga       180
tgagaaagct caattataga tgcaaagtta taactaaact actatagtag taaagaaata      240
catttcacac ccttcatata aattcactat cttggcttga ggcactccat aaaatgtatc       300
acgtgcatag taaatcttta tatttgctat ggcgttgcac tagaggactt ggactgcaac       360
aagtggatgc gcggaaaatg aaatcttctt caatagccca g                          401

        <210> 365
        <211> 356
        <212> DNA
        <213> Homo sapien

        <400> 365
ccagtgtcat atttgggctt aaaatttcaa gaagggcact tcaaatggct ttgcatttgc        60
atgtttcagt gctagagcgt aggaatagac cctggcgtcc actgtgagat gttcttcagc       120
taccagagca tcaagtctct gcagcaggtc attcttgggt aaagaaatga cttccacaaa       180
ctctccatcc cctggctttg gcttcggcct tgcgttttcg gcatcatctc cgttaatggt       240
gactgtcacg atgtgtatag tacagtttga caagcctggg tccatacaga ccgctggaga       300
acattcggca atgtcccctt tgtagccagt ttcttcttcg agctcccgga gagcag           356
```

110

```
<210> 366
<211> 1851
<212> DNA
<213> Homo sapien

<400> 366
tcatcaccat tgccagcagc ggcaccgtta gtcaggtttt ctgggaatcc cacatgagta      60
cttccgtgtt cttcattctt cttcaatagc cataaatctt ctagctctgg ctggctgttt     120
tcacttcctt taagcctttg tgactcttcc tctgatgtca gctttaagtc ttgttctgga     180
ttgctgtttt cagaagagat ttttaacatc tgttttrctt tgtagtcaga aagtaactgg     240
caaattacat gatgatgact agaaacagca tactctctgg ccgtctttcc agatcttgag     300
aagatacatc aacattttgc tcaagtagag ggctgactat acttgctgat ccacaacata     360
cagcaagtat gagagcagtt cttccatatc tatccagcgc atttaaattc gctttttct      420
tgattaaaaa tttcaccact tgctgttttt gctcatgtat accaagtagc agtggtgtga     480
ggccatgctt gttttttgat tcgatatcag caccgtataa gagcagtgct ttggccatta     540
atttatcttc attgtagaca gcatagtgta gagtggtatt tccatactca tctggaatat     600
ttggatcagt gccatgttcc agcaacatta acgcacattc atcttcctgg cattgtacgg     660
cctttgtcag agctgtcctc tttttgttgt caaggacatt aagttgacat cgtctgtcca     720
gcacgagttt tactacttct gaattcccat tggcagaggc cagatgtaga gcagtcctct     780
tttgcttgtc cctcttgttc acatccgtgt ccctgagcat gacgatgaga tcctttctgg     840
ggactttacc ccaccaggca gctctgtgga gcttgtccag atcttctcca tggacgtggt     900
acctgggatc catgaaggcg ctgtcatcgt agtctcccca agcgaccacg ttgctcttgc     960
cgctccctg cagcagggga agcagtggca gcaccacttg cacctcttgc tcccaagcgt    1020
cttcacagag gagtcgttgt ggtctccaga agtgcccacg ttgctcttgc cgctcccct    1080
gtccatccag ggaggaagaa atgcaggaaa tgaaagatgc atgcacgatg gtatactcct    1140
cagccatcaa acttctggac agcaggtcac ttccagcaag gtggagaaag ctgtccaccc    1200
acagaggatg agatccagaa accacaatat ccattcacaa acaaacactt ttcagccaga    1260
cacaggtact gaaatcatgt catctgcggc aacatggtgg aacctaccca atcacacatc    1320
aagagatgaa gacactgcag tatatctgca caacgtaata ctcttcatcc ataacaaaat    1380
aatataattt tcctctggag ccatatggat gaactatgaa ggaagaactc cccgaagaag    1440
ccagtcgcag agaagccaca ctgaagctct gtcctcagcc atcagcgcca cggacaggar    1500
tgtgtttctt ccccagtgat gcagcctcaa gttatcccga agctgccgca gcacacggtg    1560
gctcctgaga aacaccccag ctcttccggt ctaacacagg caagtcaata aatgtgataa .    1620
tcacataaac agaattaaaa gcaaagtcac ataagcatct caacagacac agaaaaggca    1680
tttgacaaaa tccagcatcc ttgtatttat tgttgcagtt ctcagaggaa atgcttctaa    1740
ctttttcccca tttagtatta tgttggctgt gggcttgtca taggtggttt ttattacttt    1800
aaggtatgtc ccttctatgc ctgttttgct gagggtttta attctcgtgc c            1851

<210> 367
<211> 668
<212> DNA
<213> Homo sapien

<400> 367
cttgagcttc caaataygga agactggccc ttacacasgt caatgttaaa atgaatgcat      60
ttcagtattt tgaagataaa attrgtagat ctataccttg tttttttgatt cgatatcagc     120
accrtataag agcagtgctt tggccattaa tttatctttc attrtagaca gcrtagtgya     180
gagtggtatt tccatactca tctggaatat ttggatcagt gccatgttcc agcaacatta     240
acgcacattc atcttcctgg cattgtacgg cctgtcagta ttagacccaa aaacaaatta     300
catatcttag gaattcaaaa taacattcca cagctttcac caactagtta tatttaaagg     360
agaaaactca tttttatgcc atgtattgaa atcaaaccca cctcatgctg atatagttgg     420
ctactgcata cctttatcag agctgtcctc tttttgttgt caaggacatt aagttgacat     480
cgtctgtcca gcaggagttt tactacttct gaattcccat tggcagaggc cagatgtaga     540
gcagtcctat gagagtgaga agacttttta ggaaattgta gtgcactagc tacagccata     600
gcaatgattc atgtaactgc aaacactgaa tagcctgcta ttactctgcc ttcaaaaaaa     660
aaaaaaa                                                              668

<210> 368
<211> 1512
<212> DNA
<213> Homo sapien
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       <400>  368
gggtcgccca gggggsgcgt gggctttcct cgggtggggtg tgggtttttcc ctgggtggggg         60
tgggctgggc trgaatcccc tgctgggggtt ggcaggtttt ggctgggatt gactttttytc        120
ttcaaacaga ttggaaaccc ggagttacct gctagttggt gaaactggtt ggtagacgcg         180
atctgttggc tactactggc ttctcctggc tgttaaaagc agatggtggt tgaggttgat         240
tccatgccgg ctgcttcttc tgtgaagaag ccatttggtc tcaggagcaa gatgggcaag         300
tggtgctgcc gttgcttccc ctgctgcagg gagagcggca agagcaacgt gggcacttct         360
ggagaccacg acgactctgc tatgaagaca ctcaggagca agatgggcaa gtggtgccgc         420
cactgcttcc cctgctgcag ggggagtggc aagagcaacg tgggcgcttc tggagaccac         480
gacgaytctg ctatgaagac actcaggaac aagatgggca agtggtgctg ccactgcttc         540
ccctgctgca gggggagcrg caagagcaag gtgggcgctt ggggagacta cgatgacagt         600
gccttcatgg agcccaggta ccacgtccgt ggagaagatc tggacaagct ccacagagct         660
gcctggtggg gtaaagtccc cagaaaggat ctcatcgtca tgctcaggga cactgacgtg         720
aacaagaagg acaagcaaaa gaggactgct ctacatctgg cctctgccaa tgggaattca         780
gaagtagtaa aactcstgct ggacagacga tgtcaactta atgtccttga caacaaaaag         840
aggacagctc tgayaaaggc cgtacaatgc caggaagatg aatgtgcgtt aatgttgctg         900
gaacatggca ctgatccaaa tattccagat gagtatggaa ataccactct rcactaygct         960
rtctayaatg aagataaatt aatggccaaa gcactgctct tatayggtgc tgatatcgaa        1020
tcaaaaaaca aggtatagat ctactaattt tatcttcaaa atactgaaat gcattcattt        1080
taacattgac gtgtgtaagg gccagtcttc cgtatttgga agctcaagca taacttgaat        1140
gaaaatattt tgaaatgacc taattatctm agactttatt ttaaatattg ttattttcaa        1200
agaagcatta gagggtacag ttttttttttt ttaaatgcac ttctggtaaa tactttttgtt        1260
gaaaacactg aatttgtaaa aggtaatact tactattttt caattttttcc ctcctaggat        1320
ttttttcccc taatgaatgt aagatggcaa aatttgccct gaaataggtt ttacatgaaa        1380
actccaagaa aagttaaaca tgtttcagtg aatagagatc ctgctccttt ggcaagttcc        1440
taaaaaacag taatagatac gaggtgatgc gcctgtcagt ggcaaggttt aagatatttc        1500
tgatctcgtg cc                                                           1512

       <210>  369
       <211>  1853
       <212>  DNA
       <213>  Homo sapien

       <400>  369
gggtcgccca gggggsgcgt gggctttcct cgggtggggtg tgggtttttcc ctgggtggggg         60
tgggctgggc trgaatcccc tgctgggggtt ggcaggtttt ggctgggatt gactttttytc        120
ttcaaacaga ttggaaaccc ggagttacct gctagttggt gaaactggtt ggtagacgcg         180
atctgttggc tactactggc ttctcctggc tgttaaaagc agatggtggt tgaggttgat         240
tccatgccgg ctgcttcttc tgtgaagaag ccatttggtc tcaggagcaa gatgggcaag         300
tggtgctgcc gttgcttccc ctgctgcagg gagagcggca agagcaacgt gggcacttct         360
ggagaccacg acgactctgc tatgaagaca ctcaggagca agatgggcaa gtggtgccgc         420
cactgcttcc cctgctgcag ggggagtggc aagagcaacg tgggcgcttc tggagaccac         480
gacgaytctg ctatgaagac actcaggaac aagatgggca agtggtgctg ccactgcttc         540
ccctgctgca gggggagcrg caagagcaag gtgggcgctt ggggagacta cgatgacagy         600
gccttcatgg akcccaggta ccacgtccrt ggagaagatc tggacaagct ccacagagct         660
gcctggtggg gtaaagtccc cagaaaggat ctcatcgtca tgctcaggga cackgaygtg         720
aacaagargg acaagcaaaa gaggactgct ctacatctgg cctctgccaa tgggaattca         780
gaagtagtaa aactcstgct ggacagacga tgtcaactta atgtccttga caacaaaaag         840
aggacagctc tgayaaaggc cgtacaatgc caggaagatg aatgtgcgtt aatgttgctg         900
gaacatggca ctgatccaaa tattccagat gagtatggaa ataccactct rcactaygct         960
rtctayaatg aagataaatt aatggccaaa gcactgctct tatayggtgc tgatatcgaa        1020
tcaaaaaaca agcatggcct cacaccactg ytacttggtr tacatgagca aaaacagcaa        1080
gtsgtgaaat ttttaatyaa gaaaaaagcg aatttaaaat gcrctggata gatatggaag        1140
ractgctctc atacttgctg tatgttgtgg atcagccaagt atagtcagcc ytctacttga        1200
gcaaaatrtt gatgtatctt ctcaagatct ggaaagacgg ccagagagta tgctgtttct        1260
agtcatcatc atgtaatttg ccagttactt tctgactaca aagaaaaaca gatgttaaaa        1320
atctcttctg aaaacagcaa tccagaacaa gacttaaagc tgacatcaga ggaagagtca        1380
caaaggctta aaggaagtga aaacagccag ccagaggcat ggaaactttt aaatttaaac        1440
ttttggttta atgttttttt ttttgccttt aataatatta gatagtccca aatgaaatwa        1500
cctatgagac taggctttga gaatcaatag attctttttt taagaatctt ttggctagga        1560
gcggtgtctc acgcctgtaa ttccagcacc ttgagaggct gaggtgggca gatcacgaga        1620
```

112

```
tcaggagatc gagaccatcc tggctaacac ggtgaaaccc catctctact aaaaatacaa    1680
aaacttagct gggtgtggtg gcgggtgcct gtagtcccag ctactcagga rgctgaggca    1740
ggagaatggc atgaacccgg gaggtggagg ttgcagtgag ccgagatccg ccactacact    1800
ccagcctggg tgacagagca agactctgtc tcaaaaaaaa aaaaaaaaaa aaa           1853
```

        <210> 370
        <211> 2184
        <212> DNA
        <213> Homo sapien

        <400> 370
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ggcacgagaa ttaaaaccct cagcaaaaca ggcatagaag ggacatacct taaagtaata      60
aaaaccacct atgacaagcc cacagccaac ataatactaa atggggaaaa gttagaagca     120
tttcctctga gaactgcaac aataaataca aggatgctgg attttgtcaa atgccttttc     180
tgtgtctgtt gagatgctta tgtgactttg cttttaattc tgtttatgtg attatcacat     240
ttattgactt gcctgtgtta gaccggaaga gctggggtgt ttctcaggag ccaccgtgtg     300
ctgcggcagc ttcgggataa cttgaggctg catcactggg gaagaaacac aytcctgtcc     360
gtggcgctga tggctgagga cagagcttca gtgtggcttc tctgcgactg gcttcttcgg     420
ggagttcttc cttcatagtt catccatatg gctccagagg aaaattatat tattttgtta     480
tggatgaaga gtattacgtt gtgcagatat actgcagtgt cttcatctct tgatgtgtga     540
ttgggtaggt tccaccatgt tgccgcagat gacatgattt cagtacctgt gtctggctga     600
aaagtgtttg tttgtgaatg gatattgtgg tttctggatc tcatcctctg tgggtggaca     660
gctttctcca ccttgctgga agtgacctgc tgtccagaag tttgatggct gaggagtata     720
ccatcgtgca tgcatctttc atttcctgca tttcttcctc cctggatgga caggggagc      780
ggcaagagca acgtgggcac ttctggagac cacaacgact cctctgtgaa gacgcttggg     840
agcaagaggt gcaagtggtg ctgccactgc ttcccctgct gcaggggagc ggcaagagca     900
acgtggtcgc ttggggagac tacgatgaca gcgccttcat ggatcccagg taccacgtcc     960
atggagaaga tctggacaag ctccacagag ctgcctggtg gggtaaagtc cccagaaagg    1020
atctcatcgt catgctcagg gacacggatg tgaacaagag ggacaagcaa aagaggactg    1080
ctctacatct ggcctctgcc aatgggaatt cagaagtagt aaaactcgtg ctggacagac    1140
gatgtcaact taatgtcctt gacaacaaaa agaggacagc tctgacaaag gccgtacaat    1200
gccaggaaga tgaatgtgcg ttaatgttgc tggaacatgg cactgatcca aatattccag    1260
atgagtatgg aaataccact ctacactatg ctgtctacaa tgaagataaa ttaatggcca    1320
aagcactgct cttatacggt gctgatatcg aatcaaaaaa caagcatggc ctcacaccac    1380
tgctacttgg tatacatgag caaaaacagc aagtggtgaa atttttaatc aagaaaaaag    1440
cgaatttaaa tgcgctggat agatatggaa gaactgctct catacttgct gtatgttgtg    1500
gatcagcaag tatagtcagc cctctacttg agcaaaatgt tgatgtatct tctcaagatc    1560
tggaaagacg gccagagagt atgctgtttc tagtcatcat catgtaattt gccagttact    1620
ttctgactac aaagaaaaac agatgttaaa aatctcttct gaaaacagca atccagaaca    1680
agacttaaag ctgacatcag aggaagagtc acaaaggctt aaaggaagtg aaaacagcca    1740
gccagaggca tggaaacttt taaatttaaa cttttggttt aatgttttttt tttttttgcct   1800
taataatatt agatagtccc aaatgaaatw acctatgaga ctaggctttg agaatcaata    1860
gattctttttt ttaagaatct tttggctagg agcggtgtct cacgcctgta attccagcac    1920
cttgagaggc tgaggtgggc agatcacgag atcaggagat cgagaccatc ctggctaaca    1980
cggtgaaacc ccatctctac taaaaataca aaaacttagc tgggtgtggt ggcgggtgcc    2040
tgtagtccca gctactcagg argctgaggc aggagaatgg catgaacccg ggaggtggag    2100
gttgcagtga ccgagatcc gccactacac tccagcctgg gtgacagagc aagactctgt    2160
ctcaaaaaaa aaaaaaaaaa aaaa                                          2184
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        <210> 371
        <211> 1855
        <212> DNA
        <213> Homo sapien

        <220>
        <221> misc_feature
        <222> (1)...(1855)
        <223> n = A,T,C or G

        <400> 371
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tgcacgcatc ggccagtgtc tgtgccacgt acactgacgc cccctgagat gtgcacgccg      60
cacgcgcacg ttgcacgcgc ggcagcggct tggctggctt gtaacggctt gcacgcgcac     120
```

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gccgcccccg cataaccgtc agactggcct gtaacggctt gcaggcgcac gccgcacgcg      180
cgtaacggct tggctgccct gtaacggctt gcacgtgcat gctgcacgcg cgttaacggc      240
ttggctggca tgtagccgct tggcttggct ttgcattytt tgctkggctk ggcgttgkty      300
tcttggattg acgcttcctc cttggatkga cgtttcctcc ttggatkgac gtttcytyty      360
tcgcgttcct ttgctggact tgacctttty tctgctgggt ttggcattcc tttggggtgg      420
gctgggtgtt ttctccgggg gggktkgccc ttcctggggt gggcgtgggk cgcccccagg      480
gggcgtgggc tttccccggg tgggtgtggg ttttcctggg gtggggtggg ctgtgctggg      540
atcccccgc tgggggttggc agggattgac tttttcttc aaacagattg gaaacccgga      600
gtaacntgct agttggtgaa actggttggt agacgcgatc tgctggtact actgtttctc      660
ctggctgtta aaagcagatg gtggctgagg ttgattcaat gccggctgct tcttctgtga      720
agaagccatt tggtctcagg agcaagatgg gcaagtggtg cgccactgct tcccctgctg      780
caggggagc ggcaagagca acgtgggcac ttctggagac cacaacgact cctctgtgaa      840
gacgcttggg agcaagaggt gcaagtggtg ctgcccactg cttcccctgc tgcaggggag      900
cggcaagagc aacgtggkcg cttggggaga ctacgatgac agcgccttca tggakcccag      960
gtaccacgtc crtggagaag atctggacaa gctccacaga gctgcctggt ggggtaaagt     1020
ccccagaaag gatctcatcg tcatgctcag ggacactgay gtgaacaaga rggacaagca     1080
aaagaggact gctctacatc tggcctctgc caatgggaat tcagaagtag taaaactcgt     1140
gctggacaga cgatgtcaac ttaatgtcct tgacaacaaa aagaggacag ctctgacaaa     1200
ggccgtacaa tgccaggaag atgaatgtgc gttaatgttg ctggaacatg gcactgatcc     1260
aaatattcca gatgagtatg gaaataccac tctacactat gctgtctaca atgaagataa     1320
attaatggcc aaagcactgc tcttatacgg tgctgatatc gaatcaaaaa acaaggtata     1380
gatctactaa ttttatcttc aaaatactga aatgcattca ttttaacatt gacgtgtgta     1440
agggccagtc ttccgtattg ggaagctcaa gcataacttg aatgaaaata ttttgaaatg     1500
acctaattat ctaagacttt attttaaata ttgttatttt caaagaagca ttagagggta     1560
cagttttttt tttttaaatg cacttctggt aaatacttttt gttgaaaaca ctgaatttgt     1620
aaaaggtaat acttactatt tttcaatttt tccctcctag gatttttttc ccctaatgaa     1680
tgtaagatgg caaaatttgc cctgaaatag gttttacatg aaaactccaa gaaaagttaa     1740
acatgtttca gtgaatagag atcctgctcc tttggcaagt tcctaaaaaa cagtaataga     1800
tacgaggtga tgcgcctgtc agtggcaagg tttaagatat ttctgatctc gtgcc          1855
```

```
      <210> 372
      <211> 1059
      <212> DNA
      <213> Homo sapien

      <400> 372
atgtggggttg gagttgattc catgccggct gcctcttctg tgaagaagcc atttggtctc           60
```

```
      <210> 372
      <211> 1059
      <212> DNA
      <213> Homo sapien

      <400> 372
gcaacgtggg cacttctgga gaccacaacg actcctctgt gaagacgctt gggagcaaga      60
ggtgcaagtg gtgctgccca ctgcttcccc tgctgcaggg gagcggcaag agcaacgtgg     120
gcgcttgrgg agactmcgat gacagygcct tcatggagcc caggtaccac gtccgtggag     180
aagatctgga caagctccac agagctgccc tggtggggta aagtccccag aaaggatctc     240
atcgtcatgc tcaggacac tgaygtgaac aagarggaca agcaaaagag gactgctcta     300
catctggcct ctgccaatgg gaattcagaa gtagtaaaac tcstgctgga cagacgatgt     360
caacttaatg tccttgacaa caaaaagagg acagctctga yaaaggccgt acaatgccag     420
gaagatgaat gtgcgttaat gttgctggaa catggcactg atccaaatat tccagatgag     480
tatggaaata ccactctrca ctaygctrtc tayaatgaag ataaattaat ggccaaagca     540
ctgctcttat ayggtgctga tatcgaatca aaaaacaagg tatagatcta ctaattttat     600
cttcaaaata ctgaaatgca ttcattttaa cattgacgtg tgtaagggcc agtcttccgt     660
atttggaagc tcaagcataa cttgaatgaa aatatttgta aatgacctaa ttatctaaga     720
ctttatttta aatattgtta ttttcaaaga agcattagag ggtacagttt tttttttttta     780
aatgcacttc tggtaaatac ttttgttgaa aacactgaat ttgtaaaagg taatacttac     840
tattttcaa tttttccctc ctaggatttt tttcccctaa tgaatgtaag atggcaaaat     900
ttgccctgaa ataggtttta catgaaaact ccaagaaaag ttaaacatgt ttcagtgaat     960
agagatcctg ctcctttggc aagttcctaa aaaacagtaa tagatacgag gtgatgcgcc    1020
tgtcagtggc aaggtttaag atatttctga tctcgtgcc                           1059
```

```
      <210> 373
      <211> 1155
      <212> DNA
      <213> Homo sapien

      <400> 373
atggtggttg aggttgattc catgccggct gcctcttctg tgaagaagcc atttggtctc           60
```

```
aggagcaaga tgggcaagtg gtgctgccgt tgcttcccct gctgcaggga gagcggcaag     120
agcaacgtgg gcacttctgg agaccacgac gactctgcta tgaagacact caggagcaag     180
atgggcaagt ggtgccgcca ctgcttcccc tgctgcaggg ggagtggcaa gagcaacgtg     240
ggcgcttctg gagaccacga cgactctgct atgaagacac tcaggaacaa gatgggcaag     300
tggtgctgcc actgcttccc ctgctgcagg gggagcggca agagcaaggt gggcgcttgg     360
ggagactacg atgacagtgc cttcatggag cccaggtacc acgtccgtgg agaagatctg     420
gacaagctcc acagagctgc ctggtggggt aaagtcccca gaaaggatct catcgtcatg     480
ctcagggaca ctgacgtgaa caagaaggac aagcaaaaga ggactgctct acatctggcc     540
tctgccaatg ggaattcaga agtagtaaaa ctcctgctgg acagacgatg tcaacttaat     600
gtccttgaca acaaaaagag gacagctctg ataaaggccg tacaatgcca ggaagatgaa     660
tgtgcgttaa tgttgctgga acatggcact gatccaaata ttccagatga gtatggaaat     720
accactctgc actacgctat ctataatgaa gataaattaa tggccaaagc actgctctta     780
tatggtgctg atatcgaatc aaaaaacaag catggcctca caccactgtt acttggtgta     840
catgagcaaa aacagcaagt cgtgaaattt ttaatcaaga aaaaagcgaa tttaaatgca     900
ctggatagat atggaaggac tgctctcata cttgctgtat gttgtggatc agcaagtata     960
gtcagccttc tacttgagca aaatattgat gtatcttctc aagatctatc tggacagacg    1020
gccagagagt atgctgtttc tagtcatcat catgtaattt gccagttact ttctgactac    1080
aaagaaaaac agatgctaaa aatctcttct gaaaacagca atccagaaaa tgtctcaaga    1140
```
                                                                      1155

```
        <210> 374
        <211> 2000
        <212> DNA
        <213> Homo sapien
```

```
        <400> 374
    atggtggttc aggttgattc catgccggct gcctcttctg tgaagaagcc atttggtctc      60
    aggagcaaga tgggcaagtg gtgctgccgt tgcttcccct gctgcaggga gagcggcaag     120
    agcaacgtgg gcacttctgg agaccacgac gactctgcta tgaagacact caggagcaag     180
    atgggcaagt ggtgccgcca ctgcttcccc tgctgcaggg ggagtggcaa gagcaacgtg     240
    ggcgcttctg gagaccacga cgactctgct atgaagacac tcaggaacaa gatgggcaag     300
    tggtgctgcc actgcttccc ctgctgcagg gggagcggca agagcaaggt gggcgcttgg     360
    ggagactacg atgacagtgc cttcatggag cccaggtacc acgtccgtgg agaagatctg     420
    gacaagctcc acagagctgc ctggtggggt aaagtcccca gaaaggatct catcgtcatg     480
    ctcagggaca ctgacgtgaa caagaaggac aagcaaaaga ggactgctct acatctggcc     540
    tctgccaatg ggaattcaga agtagtaaaa ctcctgctgg acagacgatg tcaacttaat     600
    gtccttgaca acaaaaagag gacagctctg ataaaggccg tacaatgcca ggaagatgaa     660
    tgtgcgttaa tgttgctgga acatggcact gatccaaata ttccagatga gtatggaaat     720
    accactctgc actacgctat ctataatgaa gataaattaa tggccaaagc actgctctta     780
    tatggtgctg atatcgaatc aaaaaacaag catggcctca caccactgtt acttggtgta     840
    catgagcaaa aacagcaagt cgtgaaattt ttaatcaaga aaaaagcgaa tttaaatgca     900
    ctggatagat atggaaggac tgctctcata cttgctgtat gttgtggatc agcaagtata     960
    gtcagccttc tacttgagca aaatattgat gtatcttctc aagatctatc tggacagacg    1020
    gccagagagt atgctgtttc tagtcatcat catgtaattt gccagttact ttctgactac    1080
    aaagaaaaac agatgctaaa aatctcttct gaaaacagca atccagaaaa tgtctcaaga    1140
    ctgacatcag aggaagagtc acaaaggttc aaaggcagtg aaaatagcca gccagagaaa    1200
    atgtctcaag aaccagaaat aaataaggat ggtgatagag aggttgaaga gaaaatgaag    1260
    aagcatgaaa gtaataatgt gggattacta gaaaacctga ctaatggtgt cactgctggc    1320
    aatggtgata atggattaat tcctcaaagg aagagcagaa cacctgaaaa tcagcaattt    1380
    cctgacaacg aaagtgaaga gtatcacaga atttgcgaat tagtttctga ctacaaagaa    1440
    aaacagatgc caaatactc ttctgaaaac agcaacccag aacaagactt aaagctgaca    1500
    tcagaggaag agtcacaaag gcttgagggc agtgaaaatg ccagccaga gctagaaaat    1560
    tttatggcta tcgaagaaat gaagaagcac ggaagtactc atgtcggatt cccagaaaac    1620
    ctgactaatg gtgccactgc tggcaatggt gatgatggat taattcctcc aaggaagagc    1680
    agaacacctg aaagccagca atttcctgac actgagaatg aagagtatca cagtgacgaa    1740
    caaaatgata ctcagaagca attttgtgaa gaacagaaca ctggaatatt acacgatgag    1800
    attctgattc atgaagaaaa gcagatagaa gtggttgaaa aaatgaattc tgagctttct    1860
    cttagttgta agaaagaaaa agacatcttg catgaaaata gtacgttgcg ggaagaaatt    1920
    gccatgctaa gactggagct agacacaatg aaacatcaga gccagctaaa aaaaaaaaaa    1980
    aaaaaaaaaa aaaaaaaaaa                                                 2000
```

```
        <210> 375
```

```
        <211> 2040
        <212> DNA
        <213> Homo sapien

        <400> 375
atggtggttg aggttgattc catgccggct gcctcttctg tgaagaagcc atttggtctc       60
aggagcaaga tgggcaagtg gtgctgccgt tgcttcccct gctgcaggga gagcggcaag      120
agcaacgtgg gcacttctgg agaccacgac gactctgcta tgaagacact caggagcaag      180
atgggcaagt ggtgccgcca ctgcttcccc tgctgcaggg ggagtggcaa gagcaacgtg      240
ggcgcttctg agaccacga cgactctgct atgaagacac tcaggaacaa gatgggcaag       300
tggtgctgcc actgcttccc ctgctgcagg gggagcggca agagcaaggt gggcgcttgg      360
ggagactacg atgacagtgc cttcatggag cccaggtacc acgtccgtgg agaagatctg      420
gacaagctcc acagagctgc ctggtggggt aaagtcccca gaaaggatct catcgtcatg      480
ctcagggaca ctgacgtgaa caagaaggac aagcaaaaga ggactgctct acatctggcc      540
tctgccaatg ggaattcaga agtagtaaaa ctcctgctgg cagacgatg tcaacttaat       600
gtccttgaca acaaaaagag gacagctctg ataaaggccg tacaatgcca ggaagatgaa      660
tgtgcgttaa tgttgctgga acatggcact gatccaaata ttccagatga gtatggaaat      720
accactctgc actacgctat ctataatgaa gataaattaa tggccaaagc actgctctta      780
tatggtgctg atatcgaatc aaaaaacaag catggcctca caccactgtt acttggtgta      840
catgagcaaa aacagcaagt cgtgaaattt ttaatcaaga aaaaagcgaa tttaaatgca      900
ctggatagat atggaaggac tgctctcata cttgctgtat gttgtggatc agcaagtata      960
gtcagccttc tacttgagca aaatattgat gtatcttctc aagatctatc tggacagacg     1020
gccagagagt atgctgtttc tagtcatcat catgtaattt gccagttact ttctgactac     1080
aaagaaaaac agatgctaaa aatctcttct gaaaacagca atccagaaca agacttaaag     1140
ctgacatcag aggaagagtc acaaaggttc aaaggcagtg aaaatagcca gccagagaaa     1200
atgtctcaag aaccagaaat aaataaggat ggtgatagag aggttgaaga agaaatgaag     1260
aagcatgaaa gtaataatgt gggattacta gaaaacctga ctaatggtgt cactgctggc     1320
aatggtgata atggattaat tcctcaaagg aagagcagaa cacctgaaaa tcagcaattt     1380
cctgacaacg aaagtgaaga gtatcacaga atttgcgaat tagtttctga ctacaaagaa     1440
aaacagatgc caaatactc ttctgaaaac agcaacccag aacaagactt aaagctgaca     1500
tcagaggaag agtcacaaag gcttgagggc agtgaaaatg ccagccaga gaaaagatct      1560
caagaaccag aaataaataa ggatggtgat agagagctag aaaattttat ggctatcgaa     1620
gaaatgaaga agcacggaag tactcatgtc ggattcccag aaaacctgac taatggtgcc     1680
actgctggca atggtgatga tggattaatt cctccaagga agagcagaac acctgaaagc     1740
cagcaatttc ctgacactga gaatgaagag tatcacagtg acgaacaaaa tgatactcag     1800
aagcaatttt gtgaagaaca gaacactgga atattacacg atgagattct gattcatgaa     1860
gaaaagcaga tagaagtggt tgaaaaaatg aattctgagc tttctcttag ttgtaagaaa     1920
gaaaaagaca tcttgcatga aaatagtacg ttgcgggaag aaattgccat gctaagactg     1980
gagctagaca caatgaaaca tcagagccag ctaaaaaaaa aaaaaaaaaa aaaaaaaaaa     2040

        <210> 376
        <211> 329
        <212> PRT
        <213> Homo sapien

        <400> 376
Met Asp Ile Val Val Ser Gly Ser His Pro Leu Trp Val Asp Ser Phe
1               5                   10                  15
Leu His Leu Ala Gly Ser Asp Leu Leu Ser Arg Ser Leu Met Ala Glu
            20                  25                  30
Glu Tyr Thr Ile Val His Ala Ser Phe Ile Ser Cys Ile Ser Ser Ser
        35                  40                  45
Leu Asp Gly Gln Gly Glu Arg Gln Glu Gln Arg Gly His Phe Trp Arg
    50                  55                  60
Pro Gln Arg Leu Leu Cys Glu Asp Ala Trp Glu Gln Glu Val Gln Val
65                  70                  75                  80
Val Leu Pro Leu Leu Pro Leu Leu Gln Gly Ser Gly Lys Ser Asn Val
                85                  90                  95
Val Ala Trp Gly Asp Tyr Asp Asp Ser Ala Phe Met Asp Pro Arg Tyr
            100                 105                 110
His Val His Gly Glu Asp Leu Asp Lys Leu His Arg Ala Ala Trp Trp
        115                 120                 125
```

```
Gly Lys Val Pro Arg Lys Asp Leu Ile Val Met Leu Arg Asp Thr Asp
    130             135                 140
Val Asn Lys Arg Asp Lys Gln Lys Arg Thr Ala Leu His Leu Ala Ser
145             150                 155                 160
Ala Asn Gly Asn Ser Glu Val Val Lys Leu Val Leu Asp Arg Arg Cys
            165                 170                 175
Gln Leu Asn Val Leu Asp Asn Lys Lys Arg Thr Ala Leu Thr Lys Ala
            180                 185                 190
Val Gln Cys Gln Glu Asp Glu Cys Ala Leu Met Leu Leu Glu His Gly
        195                 200                 205
Thr Asp Pro Asn Ile Pro Asp Glu Tyr Gly Asn Thr Thr Leu His Tyr
    210                 215                 220
Ala Val Tyr Asn Glu Asp Lys Leu Met Ala Lys Ala Leu Leu Leu Tyr
225             230                 235                 240
Gly Ala Asp Ile Glu Ser Lys Asn Lys His Gly Leu Thr Pro Leu Leu
            245                 250                 255
Leu Gly Ile His Glu Gln Lys Gln Gln Val Val Lys Phe Leu Ile Lys
            260                 265                 270
Lys Lys Ala Asn Leu Asn Ala Leu Asp Arg Tyr Gly Arg Thr Ala Leu
    275                 280                 285
Ile Leu Ala Val Cys Cys Gly Ser Ala Ser Ile Val Ser Pro Leu Leu
    290                 295                 300
Glu Gln Asn Val Asp Val Ser Ser Gln Asp Leu Glu Arg Arg Pro Glu
305             310                 315                 320
Ser Met Leu Phe Leu Val Ile Ile Met
            325
```

```
        <210> 377
        <211> 148
        <212> PRT
        <213> Homo sapien

        <220>
        <221> VARIANT
        <222> (1)...(148)
        <223> Xaa = Any Amino Acid

        <400> 377
Met Thr Xaa Pro Ser Trp Ser Pro Gly Thr Thr Ser Val Glu Lys Ile
1               5                   10                  15
Trp Thr Ser Ser Thr Glu Leu Pro Trp Trp Gly Lys Val Pro Arg Lys
        20                  25                  30
Asp Leu Ile Val Met Leu Arg Asp Thr Asp Val Asn Lys Xaa Asp Lys
        35                  40                  45
Gln Lys Arg Thr Ala Leu His Leu Ala Ser Ala Asn Gly Asn Ser Glu
    50                  55                  60
Val Val Lys Leu Xaa Leu Asp Arg Arg Cys Gln Leu Asn Val Leu Asp
65                  70                  75                  80
Asn Lys Lys Arg Thr Ala Leu Xaa Lys Ala Val Gln Cys Gln Glu Asp
            85                  90                  95
Glu Cys Ala Leu Met Leu Leu Glu His Gly Thr Asp Pro Asn Ile Pro
            100                 105                 110
Asp Glu Tyr Gly Asn Thr Thr Leu His Tyr Ala Xaa Tyr Asn Glu Asp
        115                 120                 125
Lys Leu Met Ala Lys Ala Leu Leu Leu Tyr Gly Ala Asp Ile Glu Ser
    130                 135                 140
Lys Asn Lys Val
145
```

```
        <210> 378
        <211> 1719
        <212> PRT
```

117

<213> Homo sapien

<400> 378

```
Met Val Val Glu Val Asp Ser Met Pro Ala Ala Ser Ser Val Lys Lys
1               5                   10                  15
Pro Phe Gly Leu Arg Ser Lys Met Gly Lys Trp Cys Cys Arg Cys Phe
            20              25                  30
Pro Cys Cys Arg Glu Ser Gly Lys Ser Asn Val Gly Thr Ser Gly Asp
        35              40                  45
His Asp Asp Ser Ala Met Lys Thr Leu Arg Ser Lys Met Gly Lys Trp
    50              55                  60
Cys Arg His Cys Phe Pro Cys Cys Arg Gly Ser Gly Lys Ser Asn Val
65              70                  75                  80
Gly Ala Ser Gly Asp His Asp Asp Ser Ala Met Lys Thr Leu Arg Asn
                85                  90                  95
Lys Met Gly Lys Trp Cys Cys His Cys Phe Pro Cys Cys Arg Gly Ser
            100                 105                 110
Gly Lys Ser Lys Val Gly Ala Trp Gly Asp Tyr Asp Asp Ser Ala Phe
        115                 120                 125
Met Glu Pro Arg Tyr His Val Arg Gly Glu Asp Leu Asp Lys Leu His
    130                 135                 140
Arg Ala Ala Trp Trp Gly Lys Val Pro Arg Lys Asp Leu Ile Val Met
145                 150                 155                 160
Leu Arg Asp Thr Asp Val Asn Lys Lys Asp Lys Gln Lys Arg Thr Ala
                165                 170                 175
Leu His Leu Ala Ser Ala Asn Gly Asn Ser Glu Val Val Lys Leu Leu
            180                 185                 190
Leu Asp Arg Arg Cys Gln Leu Asn Val Leu Asp Asn Lys Lys Arg Thr
        195                 200                 205
Ala Leu Ile Lys Ala Val Gln Cys Gln Glu Asp Glu Cys Ala Leu Met
    210                 215                 220
Leu Leu Glu His Gly Thr Asp Pro Asn Ile Pro Asp Glu Tyr Gly Asn
225                 230                 235                 240
Thr Thr Leu His Tyr Ala Ile Tyr Asn Glu Asp Lys Leu Met Ala Lys
                245                 250                 255
Ala Leu Leu Leu Tyr Gly Ala Asp Ile Glu Ser Lys Asn Lys His Gly
            260                 265                 270
Leu Thr Pro Leu Leu Leu Gly Val His Glu Gln Lys Gln Gln Val Val
        275                 280                 285
Lys Phe Leu Ile Lys Lys Lys Ala Asn Leu Asn Ala Leu Asp Arg Tyr
    290                 295                 300
Gly Arg Thr Ala Leu Ile Leu Ala Val Cys Cys Gly Ser Ala Ser Ile
305                 310                 315                 320
Val Ser Leu Leu Leu Glu Gln Asn Ile Asp Val Ser Ser Gln Asp Leu
                325                 330                 335
Ser Gly Gln Thr Ala Arg Glu Tyr Ala Val Ser Ser His His His Val
            340                 345                 350
Ile Cys Gln Leu Leu Ser Asp Tyr Lys Glu Lys Gln Met Leu Lys Ile
        355                 360                 365
Ser Ser Glu Asn Ser Asn Pro Glu Asn Val Ser Arg Thr Arg Asn Lys
    370                 375                 380
Pro Arg Thr His Met Val Val Glu Val Asp Ser Met Pro Ala Ala Ser
385                 390                 395                 400
Ser Val Lys Lys Pro Phe Gly Leu Arg Ser Lys Met Gly Lys Trp Cys
                405                 410                 415
Cys Arg Cys Phe Pro Cys Cys Arg Glu Ser Gly Lys Ser Asn Val Gly
            420                 425                 430
Thr Ser Gly Asp His Asp Asp Ser Ala Met Lys Thr Leu Arg Ser Lys
        435                 440                 445
Met Gly Lys Trp Cys Arg His Cys Phe Pro Cys Cys Arg Gly Ser Gly
    450                 455                 460
Lys Ser Asn Val Gly Ala Ser Gly Asp His Asp Asp Ser Ala Met Lys
```

```
465                    470                    475                    480
Thr Leu Arg Asn Lys Met Gly Lys Trp Cys Cys His Cys Phe Pro Cys
                485                    490                    495
Cys Arg Gly Ser Gly Lys Ser Lys Val Gly Ala Trp Gly Asp Tyr Asp
            500                    505                    510
Asp Ser Ala Phe Met Glu Pro Arg Tyr His Val Arg Gly Glu Asp Leu
        515                    520                    525
Asp Lys Leu His Arg Ala Ala Trp Trp Gly Lys Val Pro Arg Lys Asp
        530                    535                    540
Leu Ile Val Met Leu Arg Asp Thr Asp Val Asn Lys Lys Asp Lys Gln
545                    550                    555                    560
Lys Arg Thr Ala Leu His Leu Ala Ser Ala Asn Gly Asn Ser Glu Val
                565                    570                    575
Val Lys Leu Leu Leu Asp Arg Arg Cys Gln Leu Asn Val Leu Asp Asn
            580                    585                    590
Lys Lys Arg Thr Ala Leu Ile Lys Ala Val Gln Cys Gln Glu Asp Glu
        595                    600                    605
Cys Ala Leu Met Leu Leu Glu His Gly Thr Asp Pro Asn Ile Pro Asp
    610                    615                    620
Glu Tyr Gly Asn Thr Thr Leu His Tyr Ala Ile Tyr Asn Glu Asp Lys
625                    630                    635                    640
Leu Met Ala Lys Ala Leu Leu Leu Tyr Gly Ala Asp Ile Glu Ser Lys
            645                    650                    655
Asn Lys His Gly Leu Thr Pro Leu Leu Leu Gly Val His Glu Gln Lys
            660                    665                    670
Gln Gln Val Val Lys Phe Leu Ile Lys Lys Ala Asn Leu Asn Ala
        675                    680                    685
Leu Asp Arg Tyr Gly Arg Thr Ala Leu Ile Leu Ala Val Cys Cys Gly
    690                    695                    700
Ser Ala Ser Ile Val Ser Leu Leu Leu Glu Gln Asn Ile Asp Val Ser
705                    710                    715                    720
Ser Gln Asp Leu Ser Gly Gln Thr Ala Arg Glu Tyr Ala Val Ser Ser
            725                    730                    735
His His His Val Ile Cys Gln Leu Leu Ser Asp Tyr Lys Glu Lys Gln
        740                    745                    750
Met Leu Lys Ile Ser Ser Glu Asn Ser Asn Pro Glu Gln Asp Leu Lys
    755                    760                    765
Leu Thr Ser Glu Glu Glu Ser Gln Arg Phe Lys Gly Ser Glu Asn Ser
770                    775                    780
Gln Pro Glu Lys Met Ser Gln Glu Pro Glu Ile Asn Lys Asp Gly Asp
785                    790                    795                    800
Arg Glu Val Glu Glu Glu Met Lys Lys His Glu Ser Asn Asn Val Gly
            805                    810                    815
Leu Leu Glu Asn Leu Thr Asn Gly Val Thr Ala Gly Asn Gly Asp Asn
            820                    825                    830
Gly Leu Ile Pro Gln Arg Lys Ser Arg Thr Pro Glu Asn Gln Gln Phe
        835                    840                    845
Pro Asp Asn Glu Ser Glu Glu Tyr His Arg Ile Cys Glu Leu Val Ser
850                    855                    860
Asp Tyr Lys Glu Lys Gln Met Pro Lys Tyr Ser Ser Glu Asn Ser Asn
865                    870                    875                    880
Pro Glu Gln Asp Leu Lys Leu Thr Ser Glu Glu Ser Gln Arg Leu
            885                    890                    895
Glu Gly Ser Glu Asn Gly Gln Pro Glu Leu Glu Asn Phe Met Ala Ile
            900                    905                    910
Glu Glu Met Lys Lys His Gly Ser Thr His Val Gly Phe Pro Glu Asn
        915                    920                    925
Leu Thr Asn Gly Ala Thr Ala Gly Asn Gly Asp Asp Gly Leu Ile Pro
    930                    935                    940
Pro Arg Lys Ser Arg Thr Pro Glu Ser Gln Gln Phe Pro Asp Thr Glu
945                    950                    955                    960
Asn Glu Glu Tyr His Ser Asp Glu Gln Asn Asp Thr Gln Lys Gln Phe
```

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                    965                    970                    975
Cys Glu Glu Gln Asn Thr Gly Ile Leu His Asp Glu Ile Leu Ile His
            980                    985                    990
Glu Glu Lys Gln Ile Glu Val Val Glu Lys Met Asn Ser Glu Leu Ser
        995                   1000                   1005
Leu Ser Cys Lys Lys Glu Lys Asp Ile Leu His Glu Asn Ser Thr Leu
    1010                   1015                   1020
Arg Glu Glu Ile Ala Met Leu Arg Leu Glu Leu Asp Thr Met Lys His
1025                   1030                   1035                   104
Gln Ser Gln Leu Pro Arg Thr His Met Val Val Glu Val Asp Ser Met
                1045                   1050                   1055
Pro Ala Ala Ser Ser Val Lys Lys Pro Phe Gly Leu Arg Ser Lys Met
            1060                   1065                   1070
Gly Lys Trp Cys Cys Arg Cys Phe Pro Cys Cys Arg Glu Ser Gly Lys
        1075                   1080                   1085
Ser Asn Val Gly Thr Ser Gly Asp His Asp Asp Ser Ala Met Lys Thr
    1090                   1095                   1100
Leu Arg Ser Lys Met Gly Lys Trp Cys Arg His Cys Phe Pro Cys Cys
1105                   1110                   1115                   112
Arg Gly Ser Gly Lys Ser Asn Val Gly Ala Ser Gly Asp His Asp Asp
            1125                   1130                   1135
Ser Ala Met Lys Thr Leu Arg Asn Lys Met Gly Lys Trp Cys Cys His
            1140                   1145                   1150
Cys Phe Pro Cys Cys Arg Gly Ser Gly Lys Ser Lys Val Gly Ala Trp
        1155                   1160                   1165
Gly Asp Tyr Asp Asp Ser Ala Phe Met Glu Pro Arg Tyr His Val Arg
    1170                   1175                   1180
Gly Glu Asp Leu Asp Lys Leu His Arg Ala Ala Trp Trp Gly Lys Val
1185                   1190                   1195                   120
Pro Arg Lys Asp Leu Ile Val Met Leu Arg Asp Thr Asp Val Asn Lys
            1205                   1210                   1215
Lys Asp Lys Gln Lys Arg Thr Ala Leu His Leu Ala Ser Ala Asn Gly
        1220                   1225                   1230
Asn Ser Glu Val Val Lys Leu Leu Leu Asp Arg Arg Cys Gln Leu Asn
    1235                   1240                   1245
Val Leu Asp Asn Lys Lys Arg Thr Ala Leu Ile Lys Ala Val Gln Cys
    1250                   1255                   1260
Gln Glu Asp Glu Cys Ala Leu Met Leu Leu Glu His Gly Thr Asp Pro
1265                   1270                   1275                   128
Asn Ile Pro Asp Glu Tyr Gly Asn Thr Thr Leu His Tyr Ala Ile Tyr
            1285                   1290                   1295
Asn Glu Asp Lys Leu Met Ala Lys Ala Leu Leu Leu Tyr Gly Ala Asp
        1300                   1305                   1310
Ile Glu Ser Lys Asn Lys His Gly Leu Thr Pro Leu Leu Leu Gly Val
        1315                   1320                   1325
His Glu Gln Lys Gln Gln Val Val Lys Phe Leu Ile Lys Lys Lys Ala
    1330                   1335                   1340
Asn Leu Asn Ala Leu Asp Arg Tyr Gly Arg Thr Ala Leu Ile Leu Ala
1345                   1350                   1355                   136
Val Cys Cys Gly Ser Ala Ser Ile Val Ser Leu Leu Leu Glu Gln Asn
            1365                   1370                   1375
Ile Asp Val Ser Ser Gln Asp Leu Ser Gly Gln Thr Ala Arg Glu Tyr
        1380                   1385                   1390
Ala Val Ser Ser His His His Val Ile Cys Gln Leu Leu Ser Asp Tyr
        1395                   1400                   1405
Lys Glu Lys Gln Met Leu Lys Ile Ser Ser Glu Asn Ser Asn Pro Glu
    1410                   1415                   1420
Gln Asp Leu Lys Leu Thr Ser Glu Glu Glu Ser Gln Arg Phe Lys Gly
1425                   1430                   1435                   144
Ser Glu Asn Ser Gln Pro Glu Lys Met Ser Gln Glu Pro Glu Ile Asn
            1445                   1450                   1455
Lys Asp Gly Asp Arg Glu Val Glu Glu Glu Met Lys Lys His Glu Ser
```

```
                    1460              1465              1470
Asn Asn Val Gly Leu Leu Glu Asn Leu Thr Asn Gly Val Thr Ala Gly
         1475              1480              1485
Asn Gly Asp Asn Gly Leu Ile Pro Gln Arg Lys Ser Arg Thr Pro Glu
     1490              1495              1500
Asn Gln Gln Phe Pro Asp Asn Glu Ser Glu Glu Tyr His Arg Ile Cys
1505              1510              1515              152
Glu Leu Val Ser Asp Tyr Lys Glu Lys Gln Met Pro Lys Tyr Ser Ser
             1525              1530              1535
Glu Asn Ser Asn Pro Glu Gln Asp Leu Lys Leu Thr Ser Glu Glu Glu
         1540              1545              1550
Ser Gln Arg Leu Glu Gly Ser Glu Asn Gly Gln Pro Glu Lys Arg Ser
         1555              1560              1565
Gln Glu Pro Glu Ile Asn Lys Asp Gly Asp Arg Glu Leu Glu Asn Phe
     1570              1575              1580
Met Ala Ile Glu Glu Met Lys Lys His Gly Ser Thr His Val Gly Phe
1585              1590              1595              160
Pro Glu Asn Leu Thr Asn Gly Ala Thr Ala Gly Asn Gly Asp Asp Gly
             1605              1610              1615
Leu Ile Pro Pro Arg Lys Ser Arg Thr Pro Glu Ser Gln Gln Phe Pro
         1620              1625              1630
Asp Thr Glu Asn Glu Glu Tyr His Ser Asp Glu Gln Asn Asp Thr Gln
         1635              1640              1645
Lys Gln Phe Cys Glu Glu Gln Asn Thr Gly Ile Leu His Asp Glu Ile
     1650              1655              1660
Leu Ile His Glu Glu Lys Gln Ile Glu Val Val Glu Lys Met Asn Ser
1665              1670              1675              168
Glu Leu Ser Leu Ser Cys Lys Lys Glu Lys Asp Ile Leu His Glu Asn
             1685              1690              1695
Ser Thr Leu Arg Glu Glu Ile Ala Met Leu Arg Leu Glu Leu Asp Thr
         1700              1705              1710
Met Lys His Gln Ser Gln Leu
     1715
```

```
        <210> 379
        <211> 656
        <212> PRT
        <213> Homo sapien

        <400> 379
Met Val Val Glu Val Asp Ser Met Pro Ala Ala Ser Ser Val Lys Lys
1                   5                   10                  15
Pro Phe Gly Leu Arg Ser Lys Met Gly Lys Trp Cys Cys Arg Cys Phe
             20                  25                  30
Pro Cys Cys Arg Glu Ser Gly Lys Ser Asn Val Gly Thr Ser Gly Asp
         35                  40                  45
His Asp Asp Ser Ala Met Lys Thr Leu Arg Ser Lys Met Gly Lys Trp
     50                  55                  60
Cys Arg His Cys Phe Pro Cys Cys Arg Gly Ser Gly Lys Ser Asn Val
65                  70                  75                  80
Gly Ala Ser Gly Asp His Asp Asp Ser Ala Met Lys Thr Leu Arg Asn
             85                  90                  95
Lys Met Gly Lys Trp Cys Cys His Cys Phe Pro Cys Cys Arg Gly Ser
         100                 105                 110
Gly Lys Ser Lys Val Gly Ala Trp Gly Asp Tyr Asp Asp Ser Ala Phe
         115                 120                 125
Met Glu Pro Arg Tyr His Val Arg Gly Glu Asp Leu Asp Lys Leu His
     130                 135                 140
Arg Ala Ala Trp Trp Gly Lys Val Pro Arg Lys Asp Leu Ile Val Met
145                 150                 155                 160
Leu Arg Asp Thr Asp Val Asn Lys Lys Asp Lys Gln Lys Arg Thr Ala
             165                 170                 175
```

```
Leu His Leu Ala Ser Ala Asn Gly Asn Ser Glu Val Val Lys Leu Leu
        180                 185                 190
Leu Asp Arg Arg Cys Gln Leu Asn Val Leu Asp Asn Lys Lys Arg Thr
        195                 200                 205
Ala Leu Ile Lys Ala Val Gln Cys Gln Glu Asp Glu Cys Ala Leu Met
        210                 215                 220
Leu Leu Glu His Gly Thr Asp Pro Asn Ile Pro Asp Glu Tyr Gly Asn
225                 230                 235                 240
Thr Thr Leu His Tyr Ala Ile Tyr Asn Glu Asp Lys Leu Met Ala Lys
        245                 250                 255
Ala Leu Leu Leu Tyr Gly Ala Asp Ile Glu Ser Lys Asn Lys His Gly
        260                 265                 270
Leu Thr Pro Leu Leu Leu Gly Val His Glu Gln Lys Gln Gln Val Val
        275                 280                 285
Lys Phe Leu Ile Lys Lys Lys Ala Asn Leu Asn Ala Leu Asp Arg Tyr
        290                 295                 300
Gly Arg Thr Ala Leu Ile Leu Ala Val Cys Cys Gly Ser Ala Ser Ile
305                 310                 315                 320
Val Ser Leu Leu Leu Glu Gln Asn Ile Asp Val Ser Ser Gln Asp Leu
        325                 330                 335
Ser Gly Gln Thr Ala Arg Glu Tyr Ala Val Ser Ser His His His Val
        340                 345                 350
Ile Cys Gln Leu Leu Ser Asp Tyr Lys Glu Lys Gln Met Leu Lys Ile
        355                 360                 365
Ser Ser Glu Asn Ser Asn Pro Glu Gln Asp Leu Lys Leu Thr Ser Glu
        370                 375                 380
Glu Glu Ser Gln Arg Phe Lys Gly Ser Glu Asn Ser Gln Pro Glu Lys
385                 390                 395                 400
Met Ser Gln Glu Pro Glu Ile Asn Lys Asp Gly Asp Arg Glu Val Glu
        405                 410                 415
Glu Glu Met Lys Lys His Glu Ser Asn Asn Val Gly Leu Leu Glu Asn
        420                 425                 430
Leu Thr Asn Gly Val Thr Ala Gly Asn Gly Asp Asn Gly Leu Ile Pro
        435                 440                 445
Gln Arg Lys Ser Arg Thr Pro Glu Asn Gln Gln Phe Pro Asp Asn Glu
        450                 455                 460
Ser Glu Glu Tyr His Arg Ile Cys Glu Leu Val Ser Asp Tyr Lys Glu
465                 470                 475                 480
Lys Gln Met Pro Lys Tyr Ser Ser Glu Asn Ser Asn Pro Glu Gln Asp
        485                 490                 495
Leu Lys Leu Thr Ser Glu Glu Glu Ser Gln Arg Leu Glu Gly Ser Glu
        500                 505                 510
Asn Gly Gln Pro Glu Leu Glu Asn Phe Met Ala Ile Glu Glu Met Lys
        515                 520                 525
Lys His Gly Ser Thr His Val Gly Phe Pro Glu Asn Leu Thr Asn Gly
        530                 535                 540
Ala Thr Ala Gly Asn Gly Asp Asp Gly Leu Ile Pro Pro Arg Lys Ser
545                 550                 555                 560
Arg Thr Pro Glu Ser Gln Gln Phe Pro Asp Thr Glu Asn Glu Glu Tyr
        565                 570                 575
His Ser Asp Glu Gln Asn Asp Thr Gln Lys Gln Phe Cys Glu Glu Gln
        580                 585                 590
Asn Thr Gly Ile Leu His Asp Glu Ile Leu Ile His Glu Glu Lys Gln
        595                 600                 605
Ile Glu Val Val Glu Lys Met Asn Ser Glu Leu Ser Leu Ser Cys Lys
        610                 615                 620
Lys Glu Lys Asp Ile Leu His Glu Asn Ser Thr Leu Arg Glu Glu Ile
625                 630                 635                 640
Ala Met Leu Arg Leu Glu Leu Asp Thr Met Lys His Gln Ser Gln Leu
        645                 650                 655
```

<210> 380

```
<211> 671
<212> PRT
<213> Homo sapien

<400> 380
Met Val Val Glu Val Asp Ser Met Pro Ala Ala Ser Ser Val Lys Lys
 1               5                  10                  15
Pro Phe Gly Leu Arg Ser Lys Met Gly Lys Trp Cys Cys Arg Cys Phe
            20                  25                  30
Pro Cys Cys Arg Glu Ser Gly Lys Ser Asn Val Gly Thr Ser Gly Asp
        35                  40                  45
His Asp Asp Ser Ala Met Lys Thr Leu Arg Ser Lys Met Gly Lys Trp
    50                  55                  60
Cys Arg His Cys Phe Pro Cys Cys Arg Gly Ser Gly Lys Ser Asn Val
65                  70                  75                  80
Gly Ala Ser Gly Asp His Asp Asp Ser Ala Met Lys Thr Leu Arg Asn
                85                  90                  95
Lys Met Gly Lys Trp Cys Cys His Cys Phe Pro Cys Cys Arg Gly Ser
            100                 105                 110
Gly Lys Ser Lys Val Gly Ala Trp Gly Asp Tyr Asp Asp Ser Ala Phe
        115                 120                 125
Met Glu Pro Arg Tyr His Val Arg Gly Glu Asp Leu Asp Lys Leu His
    130                 135                 140
Arg Ala Ala Trp Trp Gly Lys Val Pro Arg Lys Asp Leu Ile Val Met
145                 150                 155                 160
Leu Arg Asp Thr Asp Val Asn Lys Lys Asp Lys Gln Lys Arg Thr Ala
                165                 170                 175
Leu His Leu Ala Ser Ala Asn Gly Asn Ser Glu Val Val Lys Leu Leu
            180                 185                 190
Leu Asp Arg Arg Cys Gln Leu Asn Val Leu Asp Asn Lys Lys Arg Thr
        195                 200                 205
Ala Leu Ile Lys Ala Val Gln Cys Gln Glu Asp Glu Cys Ala Leu Met
    210                 215                 220
Leu Leu Glu His Gly Thr Asp Pro Asn Ile Pro Asp Glu Tyr Gly Asn
225                 230                 235                 240
Thr Thr Leu His Tyr Ala Ile Tyr Asn Glu Asp Lys Leu Met Ala Lys
                245                 250                 255
Ala Leu Leu Leu Tyr Gly Ala Asp Ile Glu Ser Lys Asn Lys His Gly
            260                 265                 270
Leu Thr Pro Leu Leu Leu Gly Val His Glu Gln Lys Gln Gln Val Val
        275                 280                 285
Lys Phe Leu Ile Lys Lys Lys Ala Asn Leu Asn Ala Leu Asp Arg Tyr
    290                 295                 300
Gly Arg Thr Ala Leu Ile Leu Ala Val Cys Cys Gly Ser Ala Ser Ile
305                 310                 315                 320
Val Ser Leu Leu Leu Glu Gln Asn Ile Asp Val Ser Ser Gln Asp Leu
                325                 330                 335
Ser Gly Gln Thr Ala Arg Glu Tyr Ala Val Ser Ser His His His Val
            340                 345                 350
Ile Cys Gln Leu Leu Ser Asp Tyr Lys Glu Lys Gln Met Leu Lys Ile
        355                 360                 365
Ser Ser Glu Asn Ser Asn Pro Glu Gln Asp Leu Lys Leu Thr Ser Glu
    370                 375                 380
Glu Glu Ser Gln Arg Phe Lys Gly Ser Glu Asn Ser Gln Pro Glu Lys
385                 390                 395                 400
Met Ser Gln Glu Pro Glu Ile Asn Lys Asp Gly Asp Arg Glu Val Glu
                405                 410                 415
Glu Glu Met Lys Lys His Glu Ser Asn Asn Val Gly Leu Leu Glu Asn
            420                 425                 430
Leu Thr Asn Gly Val Thr Ala Gly Asn Gly Asp Asn Gly Leu Ile Pro
        435                 440                 445
Gln Arg Lys Ser Arg Thr Pro Glu Asn Gln Gln Phe Pro Asp Asn Glu
```

```
          450                  455                  460
Ser Glu Glu Tyr His Arg Ile Cys Glu Leu Val Ser Asp Tyr Lys Glu
465                  470                  475                  480
Lys Gln Met Pro Lys Tyr Ser Ser Glu Asn Ser Asn Pro Glu Gln Asp
                485                  490                  495
Leu Lys Leu Thr Ser Glu Glu Glu Ser Gln Arg Leu Glu Gly Ser Glu
                500                  505                  510
Asn Gly Gln Pro Glu Lys Arg Ser Gln Glu Pro Glu Ile Asn Lys Asp
            515                  520                  525
Gly Asp Arg Glu Leu Glu Asn Phe Met Ala Ile Glu Glu Met Lys Lys
        530                  535                  540
His Gly Ser Thr His Val Gly Phe Pro Glu Asn Leu Thr Asn Gly Ala
545                  550                  555                  560
Thr Ala Gly Asn Gly Asp Asp Gly Leu Ile Pro Pro Arg Lys Ser Arg
                565                  570                  575
Thr Pro Glu Ser Gln Gln Phe Pro Asp Thr Glu Asn Glu Glu Tyr His
                580                  585                  590
Ser Asp Glu Gln Asn Asp Thr Gln Lys Gln Phe Cys Glu Glu Gln Asn
            595                  600                  605
Thr Gly Ile Leu His Asp Glu Ile Leu Ile His Glu Glu Lys Gln Ile
        610                  615                  620
Glu Val Val Glu Lys Met Asn Ser Glu Leu Ser Leu Ser Cys Lys Lys
625                  630                  635                  640
Glu Lys Asp Ile Leu His Glu Asn Ser Thr Leu Arg Glu Glu Ile Ala
                645                  650                  655
Met Leu Arg Leu Glu Leu Asp Thr Met Lys His Gln Ser Gln Leu
                660                  665                  670
```

```
          <210> 381
          <211> 251
          <212> DNA
          <213> Homo sapien

          <400> 381
ggagaagcgt ctgctggggc aggaaggggt ttccctgccc tctcacctgt ccctcaccaa    60
ggtaacatgc ttcccctaag ggtatcccaa cccagggggcc tcaccatgac ctctgagggg   120
ccaatatccc aggagaagca ttggggagtt gggggcaggt gaaggaccca ggactcacac .  180
atcctgggcc tccaaggcag aggagagggt cctcaagaag gtcaggagga aaatccgtaa   240
caagcagtca g                                                        251

          <210> 382
          <211> 3279
          <212> DNA
          <213> Homo sapiens

          <400> 382
cttcctgcag cccccatgct ggtgaggggc acgggcagga acagtggacc caacatggaa  60
atgctggagg gtgtcaggaa gtgatcgggc tctggggcag ggaggagggg tggggagtgt  120
cactgggagg ggacatcctg cagaaggtag gagtgagcaa acacccgctg caggggaggg  180
gagagccctg cggcacctgg gggagcagag ggagcagcac ctgcccaggc ctgggaggag  240
gggcctggag ggcgtgagga ggagcgaggg ggctgcatgg ctggagtgag ggatcagggg  300
cagggcgcga gatggcctca cacagggaag agagggcccc tcctgcaggg cctcacctgg  360
gccacaggag gacactgctt ttcctctgag gagtcaggag ctgtggatgg tgctggacag  420
aagaaggaca gggcctggct caggtgtcca gaggctgtcg ctggcttccc tttgggatca  480
gactgcaggg agggagggcg gcagggttgt ggggggagtg acgatgagga tgacctgggg  540
gtggctccag gccttgcccc tgcctgggcc ctcacccagc ctccctcaca gtctcctggc  600
cctcagtctc tcccctccac tccatcctcc atctggcctc agtgggtcat tctgatcact  660
gaactgacca tacccagccc tgcccacggc cctccatggc tccccaatgc cctggagagg  720
ggacatctag tcagagagta gtcctgaaga ggtggcctct gcgatgtgcc tgtgggggca  780
gcatcctgca gatggtcccg gccctcatcc tgctgacctg tctgcaggga ctgtcctcct  840
ggaccttgcc ccttgtgcag gagctggacc ctgaagtccc ctccccatag gccaagactg  900
gagccttgtt ccctctgttg gactccctgc ccatattctt gtgggagtgg gttctggaga  960
```

124

```
catttctgtc tgttcctgag agctgggaat tgctctcagt catctgcctg cgcggttctg 1020
agagatggag ttgcctaggc agttattggg gccaatcttt ctcactgtgt ctctcctcct 1080
ttacccttag ggtgattctg ggggtccact tgtctgtaat ggtgtgcttc aaggtatcac 1140
atcatggggc cctgagccat gtgccctgcc tgaaaagcct gctgtgtaca ccaaggtggt 1200
gcattaccgg aagtggatca aggacaccat cgcagccaac ccctgagtgc ccctgtccca 1260
cccctacctc tagtaaattt aagtccacct cacgttctgg catcacttgg cctttctgga 1320
tgctggacac ctgaagcttg gaactcacct ggccgaagct cgagcctcct gagtcctact 1380
gacctgtgct ttctggtgtg gagtccaggg ctgctaggaa aaggaatggg cagacacagg 1440
tgtatgccaa tgtttctgaa atgggtataa tttcgtcctc tccttcggaa cactggctgt 1500
ctctgaagac ttctcgctca gtttcagtga ggacacacac aaagacgtgg gtgaccatgt 1560
tgtttgtggg gtgcagagat gggagggggtg gggcccaccc tggaagagtg gacagtgaca 1620
caaggtggac actctctaca gatcactgag gataagctgg agccacaatg catgaggcac 1680
acacacagca aggttgacgc tgtaaacata gcccacgctg tcctggggagc actgggaagc 1740
ctagataagg ccgtgagcag aaagaagggg aggatcctcc tatgttgttg aaggagggac 1800
tagggggaga aactgaaagc tgattaatta caggaggttt gttcaggtcc cccaaaccac 1860
cgtcagattt gatgatttcc tagcaggact tacagaaata aagagctatc atgctgtggt 1920
ttattatggt ttgttacatt gataggatac atactgaaat cagcaaacaa aacagatgta 1980
tagattagag tgtggagaaa acagaggaaa acttgcagtt acgaagactg gcaacttggc 2040
tttactaagt tttcagactg gcaggaagtc aaacctatta ggctgaggac cttgtggagt 2100
gtagctgatc cagctgatag aggaactagc caggtggggg cctttccctt tggatggggg 2160
gcatatccga cagttattct ctccaagtgg agacttacgg acagcatata attctccctg 2220
caaggatgta tgataatatg tacaaagtaa ttccaactga ggaagctcac ctgatccta 2280
gtgtccaggg tttttactgg gggtctgtag gacgagtagg gagtacttga ataattgacc 2340
tgaagtcctc agacctgagg ttccctagag ttcaaacaga tacagcatg tccagagtcc 2400
cagatgtaca aaaacaggga ttcatcacaa atcccatctt tagcatgaag ggtctggcat 2460
ggcccaaggc cccaagtata tcaaggcact tggcagaac atgccaagga atcaaatgtc 2520
atctcccagg agttattcaa gggtgagccc tttacttggg atgtacaggc tttgagcagt 2580
gcagggctgc tgagtcaacc ttttattgta caggggatga gggaagggga gaggatgagg 2640
aagcccccct ggggatttgg tttggtcttg tgatcaggtg gtctatgggg ctatccctac 2700
aaagaagaat ccagaaatag gggcacattg aggaatgata ctgagcccaa agagcattca 2760
atcattgttt tatttgcctt cttttcacac cattggtgag ggagggatta ccaccctggg 2820
gttatgaaga tggttgaaca ccccacacat agcaccggag atatgagatc aacagtttct 2880
tagccataga gattcacagc ccagagcagg aggacgctgc acaccatgca ggatgacatg 2940
ggggatgcgc tcgggattgg tgtgaagaag caaggactgt tagaggcagg ctttatagta 3000
acaagacggt ggggcaaact ctgatttccg tgggggaatg tcatggtctt gctttactaa 3060
gttttgagac tggcaggtag tgaaactcat taggctgaga accttgtgga atgcagctga 3120
cccagctgat agaggaagta gccaggtggg agcctttccc agtgggtgtg ggacatatct 3180
ggcaagattt tgtggcactc ctggttacag atactggggc agcaaataaa actgaatctt 3240
gttttcagac cttaaaaaaa aaaaaaaaaa aaaagtttt                         3279
```

```
<210> 383
<211> 155
<212> PRT
<213> Homo sapiens

<400> 383
Met Ala Gly Val Arg Asp Glr Gly Gln Gly Ala Arg Trp Pro His Thr
                  5               10                  15

Gly Lys Arg Gly Pro Leu Leu Gln Gly Leu Thr Trp Ala Thr Gly Gly
            20                  25                  30

His Cys Phe Ser Ser Glu Glu Ser Gly Ala Val Asp Gly Ala Gly Gln
        35                  40                  45

Lys Lys Asp Arg Ala Trp Leu Arg Cys Pro Glu Ala Val Ala Gly Phe
    50                  55                  60

Pro Leu Gly Ser Asp Cys Arg Glu Gly Gly Arg Gln Gly Cys Gly Gly
65                  70                  75                  80

Ser Asp Asp Glu Asp Asp Leu Gly Val Ala Pro Gly Leu Ala Pro Ala
```

                      85   90   95

Trp Ala Leu Thr Gln Pro Pro Ser Gln Ser Pro Gly Pro Gln Ser Leu
            100   105   110

Pro Ser Thr Pro Ser Ser Ile Trp Pro Gln Trp Val Ile Leu Ile Thr
            115   120   125

Glu Leu Thr Ile Pro Ser Pro Ala His Gly Pro Pro Trp Leu Pro Asn
      130   135   140

Ala Leu Glu Arg Gly His Leu Val Arg Glu
145   150

<210> 384
<211> 557
<212> DNA
<213> Homo sapiens

<400> 384
ggatcctcta gagcggccgc ctactactac taaattcgcg gccgcgtcga cgaagaagag 60
aaagatgtgt tttgttttgg actctctgtg gtcccttcca atgctgtggg tttccaacca 120
ggggaagggt cccttttgca ttgccaagtg ccataaccat gagcactact ctaccatggt 180
tctgcctcct ggccaagcag gctggtttgc aagaatgaaa tgaatgattc tacagctagg 240
acttaacctt gaaatggaaa gtcttgcaat cccatttgca ggatccgtct gtgcacatgc 300
ctctgtagag agcagcattc ccagggacct tggaaacagt tggcactgta aggtgcttgc 360
tccccaagac acatcctaaa aggtgttgta atggtgaaaa cgtcttcctt ctttattgcc 420
ccttcttatt tatgtgaaca actgtttgtc ttttttgta tctttttaa actgtaaagt 480
tcaattgtga aaatgaatat catgcaaata aattatgcga tttttttttc aaagtaaaaa 540
aaaaaaaaaa aaaaaaa   557

<210> 385
<211> 337
<212> DNA
<213> Homo sapiens

<400> 385
ttcccaggtg atgtgcgagg gaagacacat ttactatcct tgatggggct gattccttta 60
gtttctctag cagcagatgg gttaggagga agtgacccaa gtggttgact cctatgtgca 120
tctcaaagcc atctgctgtc ttcgagtacg gacacatcat cactcctgca ttgttgatca 180
aaacgtggag gtgcttttcc tcagctaaga agcccttagc aaaagctcga atagacttag 240
tatcagacag gtccagtttc cgcaccaaca cctgctggtt ccctgtcgtg gtctggatct 300
ctttggccac caattccccc ttttccacat cccggca   337

<210> 386
<211> 300
<212> DNA
<213> Homo sapiens

<400> 386
gggcccgcta ccggcccagg ccccgcctcg cgagtcctcc tccccgggtg cctgcccgca 60
gcccgctcgg cccagagggt gggcgcgggg ctgcctctac cggctggcgg ctgtaactca 120
gcgaccttgg cccgaaggct ctagcaagga cccaccgacc ccagccgcgg cggcggcggc 180
gcggactttg cccggtgtgt ggggcggagc ggactgcgtg tccgcggacg ggcagcgaag 240
atgttagcct tcgctgccag gaccgtggac cgatcccagg gctgtggtgt aacctcagcc 300

<210> 387
<211> 537
<212> DNA
<213> Homo sapiens

```
<400> 387
gggccgagtc gggcaccaag ggactctttg caggcttcct tcctcggatc atcaaggctg 60
cccctcctg tgccatcatg atcagcacct atgagttcgg caaaagcttc ttccagaggc 120
tgaaccagga ccggcttctg ggcggctgaa aggggcaagg aggcaaggac cccgtctctc 180
ccacggatgg ggagagggca ggaggagacc cagccaagtg ccttttcctc agcactgagg 240
gaggggctt gtttcccttc cctcccggcg acaagctcca gggcagggct gtccctctgg 300
gcggcccagc acttcctcag acacaacttc ttcctgctgc tccagtcgtg gggatcatca 360
cttacccacc ccccaagttc aagaccaaat cttccagctg cccccttcgt gtttccctgt 420
gtttgctgta gctgggcatg tctccaggaa ccaagaagcc ctcagcctgg tgtagtctcc 480
ctgacccttg ttaattcctt aagtctaaag atgatgaact tcaaaaaaaa aaaaaaa    537
```

```
<210> 388
<211> 520
<212> DNA
<213> Homo sapiens
```

```
<400> 388
aggataattt ttaaaccaat caaatgaaaa aaacaaacaa acaaaaaagg aaatgtcatg 60
tgaggttaaa ccagtttgca ttcccctaat gtggaaaaag taagaggact actcagcact 120
gtttgaagat tgcctcttct acagcttctg agaattgtgt tatttcactt gccaagtgaa 180
ggaccccctc cccaacatgc cccagcccac ccctaagcat ggtcccttgt caccaggcaa 240
ccaggaaact gctacttgtg gacctcacca gagaccagga gggtttggtt agctcacagg 300
acttcccca ccccagaaga ttagcatccc atactagact catactcaac tcaactaggc 360
tcatactcaa ttgatggtta ttagacaatt ccatttcttt ctggttatta taaacagaaa 420
atctttcctc ttctcattac cagtaaaggc tcttggtatc tttctgttgg aatgatttct 480
atgaacttgt cttattttaa tggtgggttt ttttctggt               520
```

```
<210> 389
<211> 365
<212> DNA
<213> Homo sapiens
```

```
<400> 389
cgttgcccca gtttgacaga aggaaaggcg gagcttattc aaagtctaga gggagtggag 60
gagttaaggc tggatttcag atctgcctgg ttccagccgc agtgtgccct ctgctccccc 120
aacgactttc caaataatct caccagcgcc ttccagctca ggcgtcctag aagcgtcttg 180
aagcctatgg ccagctgtct ttgtgttccc tctcacccgc ctgtcctcac agctgagact 240
cccaggaaac cttcagacta ccttcctctg ccttcagcaa ggggcgttgc ccacattctc 300
tgagggtcag tggaagaacc tagactccca ttgctagagg tagaaagggg aagggtgctg 360
gggag                                                   365
```

```
<210> 390
<211> 221
<212> DNA
<213> Homo sapiens
```

```
<220>
<221> misc_feature
<222> (1)...(221)
<223> n = A,T,C or G
```

```
<400> 390
tgcctctcca tcctggcccc gacttctctg tcaggaaagt ggggatggac cccatctgca 60
tacacggntt ctcatgggtg tggaacatct ctgcttgcgg tttcaggaag gcctctggct 120
gctctangag tctgancnga ntcgttgccc cantntgaca naaggaaagg cggagcttat 180
tcaaagtcta gagggagtgg aggagttaag gctggatttc a           221
```

```
<210> 391
<211> 325
<212> DNA
<213> Homo sapiens
```

```
<220>
<221> misc_feature
<222> (1)...(325)
<223> n = A,T,C or G

<400> 391
tggagcaggt cccgaggcct ccctagagcc tggggccgac tctgtgncga tgcangcttt 60
ctctcgcgcc cagcctggag ctgctcctgg catctaccaa caatcagncg aggcgagcag 120
tagccagggc actgctgcca acagccagtc cnnataccat catgtnaccc ggtgngctct 180
naanttngat ntccanagcc ctacccatcn tagttctgct ctcccaccgg ntaccagccc 240
cactgcccag gaatcctaca gccagtaccc tgtcccgacg tctctaccta ccagtacgat 300
gagacctccg gctactacta tgacc                                      325


<210> 392
<211> 277
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(277)
<223> n = A,T,C or G

<400> 392
atattgttta actccttcct ttatatcttt taacattttc atggngaaag gttcacatct 60
agtctcactt nggcnagngn ctcctacttg agtctcttcc ccggcctgnn ccagtngnaa 120
antaccanga accgncatgn cttaanaacn ncctggtttn tgggttnntc aatgactgca 180
tgcagtgcac caccctgtcc actacgtgat gctgtaggat taaagtctca cagtgggcgg 240
ctgaggatac agcgccgcgt cctgtgttgc tggggaa                          277


<210> 393
<211> 566
<212> DNA
<213> Homo sapiens

<400> 393
actagtccag tgtggtggaa ttcgcggccg cgtcgacgga caggtcagct gtctggctca 60
gtgatctaca ttctgaagtt gtctgaaaat gtcttcatga ttaaattcag cctaaacgtt 120
ttgccgggaa cactgcagag acaatgctgt gagtttccaa ccttagccca tctgcgggca 180
gagaaggtct agtttgtcca tcagcattat catgatatca ggactggtta cttggttaag 240
gaggggtcta ggagatctgt ccctttttaga gacaccttac ttataatgaa gtatttggga 300
gggtggtttt caaaagtaga aatgtcctgt attccgatga tcatcctgta aacattttat 360
catttattaa tcatccctgc ctgtgtctat tattatattc atatctctac gctggaaact 420
ttctgcctca atgtttactg tgcctttgtt tttgctagtt tgtgttgttg aaaaaaaaaa 480
cattctctgc ctgagttta attttgtcc aaagttattt taatctatac aattaaaagc 540
ttttgcctat caaaaaaaaa aaaaaa                                     566


<210> 394
<211> 384
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(384)
<223> n = A,T,C or G

<400> 394
gaacatacat gtcccggcac ctgagctgca gtctgacatc atcgccatca cgggcctcgc 60
tgcaaattng gaccgggcca aggctggact gctggagcgt gtgaaggagc tacaggccna 120
gcaggaggac cgggctttaa ggagttttaa gctgagtgtc actgtagacc ccaaatacca 180
tcccaagatt atcgggagaa aggggcagt aattacccaa atccggttgg agcatgacgt 240
```

```
gaacatccag tttcctgata aggacgatgg gaaccagccc caggaccaaa ttaccatcac 300
agggtacgaa aagaacacag aagctgccag ggatgctata ctgagaattg tgggtgaact 360
tgagcagatg gtttctgagg acgt                                        384
```

<210> 395
<211> 399
<212> DNA
<213> Homo sapiens

<400> 395
```
ggcaaaactg tgtgacctca ataagacctc gcagatccaa ggtcaagtat cagaagtgac 60
tctgaccttg gactccaaga cctacatcaa cagcctggct atattagatg atgagccagt 120
tatcagaggt ttcatcattg cggaaattgt ggagtctaag gaaatcatgg cctctgaagt 180
attcacgtct ttccagtacc ctgagttctc tatagagttg cctaacacag gcagaattgg 240
ccagctactt gtctgcaatt gtatcttcaa gaataccctg gccatccctt tgactgacgt 300
caagttctct ttggaaagcc tgggcatctc ctcactacag acctctgacc atgggacggt 360
gcagcctggt gagaccatcc aatcccaaat aaaatgcac                        399
```

<210> 396
<211> 403
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(403)
<223> n = A,T,C or G

<400> 396
```
tggagttntc agtgcaaaca agccataaag cttcagtagc aaattactgt ctcacagaaa 60
gacattttca acttctgctc cagctgctga taaaacaaat catgtgttta gcttgactcc 120
agacaaggac aacctgttcc ttcataactc tctagagaaa aaaaggagtt gttagtagat 180
actaaaaaaa gtggatgaat aatctggata ttttttcctaa aaagattcct tgaaacacat 240
taggaaaatg gagggcctta tgatcagaat gctagaatta gtccattgtg ctgaagcagg 300
gtttagggga gggagtgagg gataaaagaa ggaaaaaaag aagagtgaga aaacctattt 360
atcaaagcag gtgctatcac tcaatgttag gccctgctct ttt                  403
```

<210> 397
<211> 100
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(100)
<223> n = A,T,C or G

<400> 397
```
actagtncag tgtggtggaa ttcgcggccg cgtcgaccta naanccatct ctatagcaaa 60
tccatccccg ctcctggttg gtnacagaat gactgacaaa                       100
```

<210> 398
<211> 278
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(278)
<223> n = A,T,C or G

<400> 398

129

```
gcggccgcgt cgacagcagt tccgccagcg ctcgcccctg ggtgggggatg tgctgcacgc 60
ccacctggac atctggaagt cagcggcctg gatgaaagag cggacttcac ctggggcgat 120
tcactactgt gcctcgacca gtgaggagag ctggaccgac agcgaggtgg actcatcatg 180
ctccgggcag cccatccacc tgtggcagtt cctcaaggag ttgctactca agccccacag 240
ctatggccgc ttcattangt ggctcaacaa ggagaagg                         278
```

<210> 399
<211> 298
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(298)
<223> n = A,T,C or G

```
<400> 399
acggaggtgg aggaagcgnc cctgggatcg anaggatggg tcctgncatt gaccncctcn 60
ggggtgccng catggagcgc atgggcgcgg gcctgggcca cggcatggat cgcgtgggct 120
ccgagatcga gcgcatgggc ctggtcatgg accgcatggg ctccgtggag cgcatgggct 180
ccggcattga gcgcatgggc ccgctgggcc tcgaccacat ggcctccanc attgancgca 240
tgggccagac catggagcgc attggctctg gcgtggagcn catgggtgcc ggcatggg   298
```

<210> 400
<211> 548
<212> DNA
<213> Homo sapiens

```
<400> 400
acatcaacta cttcctcatt ttaaggtatg gcagttccct tcatcccctt ttcctgcctt 60
gtacatgtac atgtatgaaa tttccttctc ttaccgaact ctctccacac atcacaaggt 120
caaagaacca cacgcttaga agggtaagag ggcaccctat gaaatgaaat ggtgatttct 180
tgagtctctt ttttccacgt ttaaggggcc atggcaggac ttagagttgc gagttaagac 240
tgcagagggc tagagaatta tttcatacag gctttgaggc cacccatgtc acttatcccg 300
tataccctct caccatcccc ttgtctactc tgatgccccc aagatgcaac tgggcagcta 360
gttggcccca taattctggg cctttgttgt ttgtttttaat tacttgggca tcccaggaag 420
ctttccagtg atctcctacc atgggccccc ctcctgggat caagcccctc ccaggccctg 480
tccccagccc ctcctgcccc agcccacccg cttgccttgg tgctcagccc tcccattggg 540
agcaggtt                                                          548
```

<210> 401
<211> 355
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(355)
<223> n = A,T,C or G

```
<400> 401
actgtttcca tgttatgttt ctacacattg ctacctcagt gctcctggaa acttagcttt 60
tgatgtctcc aagtagtcca ccttcattta actctttgaa actgtatcat ctttgccaag 120
taagagtggt ggcctatttc agctgctttg acaaaatgac tggctcctga cttaacgttc 180
tataaatgaa tgtgctgaag caaagtgccc atggtggcgg cgaagaagan aaagatgtgt 240
tttgttttgg actctctgtg gtcccttcca atgctgnggg tttccaacca ggggaagggt 300
ccctttttgca ttgccaagtg ccataaccat gagcactact ctaccatggn tctgc       355
```

<210> 402
<211> 407
<212> DNA
<213> Homo sapiens

130

```
<220>
<221> misc_feature
<222> (1)...(407)
<223> n = A,T,C or G

<400> 402
atggggcaag ctggataaag aaccaagacc cactggagta tgctgtcttc aagaaaccca 60
tctcacatgc ggtggcatac ataggctcaa aataaaggaa tggagaaaaa tatttcaagc 120
aaatggaaaa cagaaaaaag caggtgttgc actcctactt tctgacaaaa cagactatgc 180
gaataaagat aaaaaagaga aggacattac aaaggtggtc ctgacctttg ataaatctca 240
ttgcttgata ccaacctggg ctgtttttaat tgcccaaacc aaaaggataa tttgctgagg 300
ttgtggagct tctcccctgc agagagtccc tgatctccca aaatttggtt gagatgtaag 360
gntgattttg ctgacaactc cttttctgaa gttttactca tttccaa             407

<210> 403
<211> 303
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(303)
<223> n = A,T,C or G

<400> 403
cagtatttat agccnaactg aaaagctagt agcaggcaag tctcaaatcc aggcaccaaa 60
tcctaagcaa gagccatggc atggtgaaaa tgcaaaagga gagtctggcc aatctacaaa 120
tagagaacaa gacctactca gtcatgaaca aaaaggcaga caccaacatg gatctcatgg 180
gggattggat attgtaatta tagagcagga agatgacagt gatcgtcatt tggcacaaca 240
tcttaacaac gaccgaaacc cattatttac ataaacctcc attcggtaac catgttgaaa 300
gga                                                             303

<210> 404
<211> 225
<212> DNA
<213> Homo sapiens

<400> 404
aagtgtaact tttaaaaatt tagtggattt tgaaaattct tagaggaaag taaaggaaaa 60
attgttaatg cactcattta cctttacatg gtgaaagttc tctcttgatc ctacaaacag 120
acattttcca ctcgtgtttc catagttgtt aagtgtatca gatgtgttgg gcatgtgaat 180
ctccaagtgc ctgtgtaata aataaagtat ctttatttca ttcat             225

<210> 405
<211> 334
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(334)
<223> n = A,T,C or G

<400> 405
gagctgttat actgtgagtt ctactaggaa atcatcaaat ctgagggttg tctggaggac 60
ttcaatacac ctcccccat agtgaatcag cttccagggg gtccagtccc tctccttact 120
tcatccccat cccatgccaa aggaagaccc tccctccttg gctcacagcc ttctctaggc 180
ttcccagtgc ctccaggaca gagtgggtta tgttttcagc tccatccttg ctgtgagtgt 240
ctggtgcggt tgtgcctcca gcttctgctc agtgcttcat ggacagtgtc cagcccatgt 300
cactctccac tctctcanng tggatcccac ccct                          334
```

131

```
<210> 406
<211> 216
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(216)
<223> n = A,T,C or G

<400> 406
tttcatacct aatgagggag ttganatnac atnnaaccag gaaatgcatg gatctcaang 60
gaaacaaaca cccaataaac tcggagtggc agactgacaa ctgtgagaca tgcacttgct 120
acnaaacaca aatttnatgt tgcacccttg tttctacacc tgtgggttat gacaaagaca 180
actgccaaag aatnttcaag aaggaggact gccant                           216

<210> 407
<211> 413
<212> DNA
<213> Homo sapiens

<400> 407
gctgacttgc tagtatcatc tgcattcatt gaagcacaag aacttcatgc cttgactcat 60
gtaaatgcaa taggattaaa aaataaattt gatatcacat ggaaacagac aaaaaatatt 120
gtacaacatt gcacccagtg tcagattcta cacctggcca ctcaggaagc aagagttaat 180
cccagaggtc tatgtcctaa tgtgttatgg caaatggatg tcatgcacgt accttcattt 240
ggaaaattgt catttgtcca tgtgacagtt gatacttatt cacatttcat atgggcaacc 300
tgccagacag gagaaagtct tcccatgtta aaagacattt attatcttgt tttcctgtca 360
tgggagttcc agaaaaagtt aaaacagaca atgggccagg ttctgtagta aag         413

<210> 408
<211> 183
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(183)
<223> n = A,T,C or G

<400> 408
ggagctngcc ctcaattcct ccatntctat gttancatat ttaatgtctt ttgnnattaa 60
tncttaacta gttaatcctt aaagggctan ntaatcctta actagtccct ccattgtgag 120
cattatcctt ccagtattcn ccttctnttt tatttactcc ttcctggcta cccatgtact 180
ntt                                                               183

<210> 409
<211> 250
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(250)
<223> n = A,T,C or G

<400> 409
cccacgcatg ataagctctt tatttctgta agtcctgcta ggaaatcatc aaatctgacg 60
gtggtttggg ggacctgaac aaacctcctg taattaatca gctttcagtt tctcccccta 120
gtccctcctt caacaacata ggaggatcct ccccttcttt ctgctcacgg ccttatctag 180
gcttcccagt gcccccagga cagcgtgggc tatgtttaca gcgcntcctt gctggggggg 240
ggccntatgc                                                        250
```

132

```
<210> 410
<211> 306
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(306)
<223> n = A,T,C or G

<400> 410
ggctggtttg caagaatgaa atgaatgatt ctacagctag gacttaacct tgaaatggaa 60
agtcttgcaa tcccatttgc aggatccgtc tgtgcacatg cctctgtaga gagcagcatt 120
cccagggacc ttggaaacag ttggcactgt aaggtgcttg ctccccaaga cacatcctaa 180
aaggtgttgt aatggtgaaa accgcttcct tctttattgc cccttcttat ttatgtgaac 240
nactggttgg cttttttttgn atctttttta aactggaaag ttcaattgng aaaatgaata 300
tcntgc                                                           306

<210> 411
<211> 261
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(261)
<223> n = A,T,C or G

<400> 411
agagatattn cttaggtnaa agttcataga gttcccatga actatatgac tggccacaca 60
ggatcttttg tatttaagga ttctgagatt ttgcttgagc aggattagat aaggctgttc 120
tttaaatgtc tgaaatggaa cagatttcaa aaaaaaaccc cacaatctag ggtgggaaca 180
aggaaggaaa gatgtgaata ggctgatggg caaaaaacca atttacccat cagttccagc 240
cttctctcaa ggngaggcaa a                                           261

<210> 412
<211> 241
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(241)
<223> n = A,T,C or G

<400> 412
gttcaatgtt acctgacatt tctacaacac cccactcacc gatgtattcg ttgcccagtg 60
ggaacatacc agcctgaatt tggaaaaaat aattgtgttt cttgcccagg aaatactacg 120
actgactttg atggctccac aaacataacc cagtgtaaaa acagaagatg tggaggggag 180
ctgggagatt tcactgggta cattgaattc ccaaactacc cangcaatta cccagccaac 240
a                                                                241

<210> 413
<211> 231
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(231)
<223> n = A,T,C or G
```

```
<400> 413
aactcttaca atccaagtga ctcatctgtg tgcttgaatc ctttccactg tctcatctcc 60
ctcatccaag tttctagtac cttctctttg ttgtgaagga taatcaaact gaacaacaaa 120
aagtttactc tcctcatttg gaacctaaaa actctcttct tcctgggtct gagggctcca 180
agaatccttg aatcanttct cagatcattg gggacaccan atcaggaacc t           231

<210> 414
<211> 234
<212> DNA
<213> Homo sapiens

<400> 414
actgtccatg aagcactgag cagaagctgg aggcacaacg caccagacac tcacagcaag 60
gatggagctg aaaacataac ccactctgtc ctggaggcac tgggaagcct agagaaggct 120
gtgagccaag gagggagggt cttcctttgg catgggatgg ggatgaagta aggagaggga 180
ctggaccccc tggaagctga ttcactatgg ggggaggtgt attgaagtcc tcca        234

<210> 415
<211> 217
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(217)
<223> n = A,T,C or G

<400> 415
gcataggatt aagactgagt atcttttcta cattctttta actttctaag gggcacttct 60·
caaaacacag accaggtagc aaatctccac tgctctaagg ntctcaccac cactttctca 120
cacctagcaa tagtagaatt cagtcctact tctgaggcca gaagaatggt tcagaaaaat 180
antggattat aaaaaataac aattaagaaa aataatc                           217

<210> 416
<211> 213
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(213)
<223> n = A,T,C or G

<400> 416
atgcatatnt aaagganact gcctcgcttt tagaagacat ctggnctgct ctctgcatga 60
ggcacagcag taaagctctt tgattcccag aatcaagaac tctccccttc agactattac 120
cgaatgcaag gtggttaatt gaaggccact aattgatgct caaatagaag gatattgact 180
atattggaac agatggagtc tctactacaa aag                               213

<210> 417
<211> 303
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(303)
<223> n = A,T,C or G

<400> 417
nagtcttcag gcccatcagg gaagttcaca ctggagagaa gtcatacata tgtactgtat 60
```

134

```
gtgggaaagg ctttactctg agttcaaatc ttcaagccca tcagagagtc cacactggag 120
agaagccata caaatgcaat gagtgtggga agagcttcag gagggattcc cattatcaag 180
ttcatctagt ggtccacaca ggagagaaac cctataaatg tgagatatgt gggaagggct 240
tcantcaaag ttcgtatctt caaatccatc ngaaggncca cagtatanan aaacctttta 300
agt                                                               303
```

```
<210> 418
<211> 328
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(328)
<223> n = A,T,C or G
```

```
<400> 418
tttttggcgg tggtggggca gggacgggac angagtctca ctctgttgcc caggctggag 60
tgcacaggca tgatctcggc tcactacaac ccctgcctcc catgtccaag cgattcttgt 120
gcctcagcct tccctgtagc tagaattaca ggcacatgcc accacaccca gctagttttt 180
gtattttag tagagacagg gtttcaccat gttggccagg ctggtctcaa actcctnacc 240
tcagnggtca ggctggtctc aaactcctga cctcaagtga tctgcccacc tcagcctccc 300
aaagtgctan gattacaggc cgtgagcc                                    328
```

```
<210> 419
<211> 389
<212> DNA
<213> Homo sapiens

<220>   .
<221> misc_feature
<222> (1)...(389)
<223> n = A,T,C or G
```

```
<400> 419
cctcctcaag acggcctgtg gtccgcctcc cggcaaccaa gaagcctgca gtgccatatg 60
acccctgagc catggactgg agcctgaaag gcagcgtaca ccctgctcct gatcttgctg 120
cttgtttcct ctctgtggct ccattcatag cacagttgtt gcactgaggc ttgtgcaggc 180
cgagcaaggc caagctggct caaagagcaa ccagtcaact ctgccacggt gtgccaggca 240
ccggttctcc agccaccaac ctcactcgct cccgcaaatg gcacatcagt tcttctaccc 300
taaaggtagg accaaagggc atctgctttt ctgaagtcct ctgctctatc agccatcacg 360
tggcagccac tcnggctgtg tcgacgcgg                                   389
```

```
<210> 420
<211> 408
<212> DNA
<213> Homo sapiens
```

```
<400> 420
gttcctccta actcctgcca gaaacagctc tcctcaacat gagagctgca cccctcctcc 60
tggccagggc agcaagcctt agccttggct tcttgtttct gcttttttc tggctagacc 120
gaagtgtact agccaaggag ttgaagtttg tgactttggt gtttcggcat ggagaccgaa 180
gtcccattga caccttccc actgaccca taaaggaatc ctcatggcca caaggatttg 240
gccaactcac ccagctgggc atggagcagc attatgaact tggagagtat ataagaaaga 300
gatatagaaa attcttgaat gagtcctata aacatgaaca ggtttatatt cgaagcacag 360
acgttgaccg gactttgatg aagtgctatg acaaacctgg caagcccg              408
```

```
<210> 421
<211> 352
<212> DNA
<213> Homo sapiens
```

```
<220>
<221> misc_feature
<222> (1)...(352)
<223> n = A,T,C or G

<400> 421
gctcaaaaat cttttactg atnggcatgg ctacacaatc attgactatt acggaggcca 60
gaggagaatg aggcctggcc tgggagccct gtgcctacta naagcacatt agattatcca 120
ttcactgaca gaacaggtct tttttgggtc cttcttctcc accacnatat acttgcagtc 180
ctccttcttg aagattcttt ggcagttgtc tttgtcataa cccacaggtg tagaaacaag 240
ggtgcaacat gaaatttctg tttcgtagca agtgcatgtc tcacaagttg gcangtctgc 300
cactccgagt ttattgggtg tttgtttcct ttgagatcca tgcatttcct gg         352


<210> 422
<211> 337
<212> DNA
<213> Homo sapiens

<400> 422
atgccaccat gctggcaatg cagcgggcgg tcgaaggcct gcatatccag cccaagctgg 60
cgatgatcga cggcaaccgt tgcccgaagt tgccgatgcc agccgaagcg gtggtcaagg 120
gcgatagcaa ggtgccggcg atcgcggcgg cgtcaatcct ggccaaggtc agccgtgatc 180
gtgaaatggc agctgtcgaa ttgatctacc cggggttatg catcggcggg cataagggct 240
atccgacacc ggtgcacctg gaagccttgc agcggctggg gccgacgccg attcaccgac 300
gcttcttccg ccggtacggc tggcctatga aaattat                          337


<210> 423
<211> 310
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(310)
<223> n = A,T,C or G

<400> 423
gctcaaaaat cttttactg atatggcatg gctacacaat cattgactat tagaggccag 60
aggagaatga ggcctggcct gggagccctg tgcctactan aagcncatta gattatccat 120
tcactgacag aacaggtctt ttttgggtcc ttcttctcca ccacgatata cttgcagtcc 180
tccttcttga agattctttg gcagttgtct ttgtcataac ccacaggtgt anaaacaagg 240
gtgcaacatg aaatttctgt ttcgtagcaa gtgcatgtct cacagttgtc aagtctgccc 300
tccgagttta                                                        310


<210> 424
<211> 370
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(370)
<223> n = A,T,C or G

<400> 424
gctcaaaaat cttttactg ataggcatgg ctacacaatc attgactatt agaggccaga 60
ggagaatgag gcctggcctg ggagccctgt gcctactaga agcacattag attatccatt 120
cactgacaga acaggtcttt tttgggtcct tcttctccac cacgatatac ttgcagtcct 180
ccttcttgaa gattctttgg cagttgtctt tgtcataacc cacaggtgta gaaacatcct 240
ggttgaatct cctggaactc cctcattagg tatgaaatag catgatgcat tgcataaagt 300
cacgaaggtg gcaaagatca caacgctgcc cagganaaca ttcattgtga taagcaggac 360
tccgtcgacg                                                        370
```

136

```
<210> 425
<211> 216
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(216)
<223> n = A,T,C or G

<400> 425
aattgctatn ntttattttg ccactcaaaa taattaccaa aaaaaaaaaa tnttaaatga 60
taacaacnca acatcaaggn aaananaaca ggaatggntg actntgcata aatnggccga 120
anattatcca ttatnttaag ggttgacttc aggntacagc acacagacaa acatgcccag 180
gaggntntca ggaccgctcg atgtnttntg aggagg                         216

<210> 426
<211> 596
<212> DNA
<213> Homo sapiens

<400> 426
cttccagtga ggataaccct gttgccccgg gccgaggttc tccattaggc tctgattgat 60
tggcagtcag tgatggaagg gtgttctgat cattccgact gccccaaggg tcgctggcca 120
gctctctgtt ttgctgagtt ggcagtagga cctaatttgt taattaagag tagatggtga 180
gctgtccttg tattttgatt aacctaatgg ccttcccagc acgactcgga ttcagctgga 240
gacatcacgg caacttttaa tgaaatgatt tgaagggcca ttaagaggca cttcccgtta 300
ttaggcagtt catctgcact gataacttct tggcagctga gctggtcgga gctgtggccc 360
aaacgcacac ttggcttttg gttttgagat acaactctta atcttttagt catgcttgag 420
ggtggatggc cttttcagct ttaacccaat ttgcactgcc ttggaagtgt agccaggaga 480
atacactcat atactcgtgg gcttagaggc cacagcagat gtcattggtc tactgcctga 540
gtcccgctgg tcccatccca ggaccttcca tcggcgagta cctgggagcc cgtgct      596

<210> 427
<211> 107
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(107)
<223> n = A,T,C or G

<400> 427
gaagaattca agttaggttt attcaaaggg cttacngaga atcctanacc caggncccag 60
cccgggagca gccttanaga gctcctgttt gactgcccgg ctcagng              107

<210> 428
<211> 38
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(38)
<223> n = A,T,C or G

<400> 428
gaacttccna anaangactt tattcactat tttacatt                        38

<210> 429
```

137

```
<211> 544
<212> DNA
<213> Homo sapiens

<400> 429
ctttgctgga cggaataaaa gtggacgcaa gcatgacctc ctgatgaggg cgctgcattt 60
attgaagagc ggctgcagcc ctgcggttca gattaaaatc cgagaattgt atagacgccg 120
atatccacga actcttgaag gactttctga tttatccaca atcaaatcat cggttttcag 180
tttggatggt ggctcatcac ctgtagaacc tgacttggcc gtggctggaa tccactcgtt 240
gccttccact tcagttacac ctcactcacc atcctctcct gttggttctg tgctgcttca 300
agatactaag cccacatttg agatgcagca gccatctccc ccaattcctc ctgtccatcc 360
tgatgtgcag ttaaaaaatc tgccctttta tgatgtcctt gatgttctca tcaagcccac 420
gagtttagtt caaagcagta ttcagcgatt tcaagagaag ttttttattt ttgctttgac 480
acctcaacaa gttagagaga tatgcatatc cagggatttt ttgccaggtg gtaggagaga 540
ttat                                                             544

<210> 430
<211> 507
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(507)
<223> n = A,T,C or G

<400> 430
cttatcncaa tggggctccc aaacttggct gtgcagtgga aactccgggg gaattttgaa 60
gaacactgac acccatcttc caccccgaca ctctgattta attgggctgc agtgagaaca 120
gagcatcaat ttaaaaagct gcccagaatg ttntcctggg cagcgttgtg atctttgccn 180
ccttcgtgac tttatgcaat gcatcatgct atttcatacc taatgaggga gttccaggag 240
attcaaccag gatgtttcta cncctgtggg ttatgacaaa gacaactgcc aaagaatntt 300
caagaaggag gactgcaagt atatcgtggt ggagaagaag gacccaaaaa agacctgttc 360
tgtcagtgaa tggataatct aatgtgcttc tagtaggcac agggctccca ggccaggcct 420
cattctcctc tggcctctaa tagtcaatga ttgtgtagcc atgcctatca gtaaaaagat 480
ttttgagcaa aaaaaaaaaa aaaaaaa                                    507

<210> 431
<211> 392
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(392)
<223> n = A,T,C or G

<400> 431
gaaaattcag aatggataaa aacaaatgaa gtacaaaata tttcagattt acatagcgat 60
aaacaagaaa gcacttatca ggaggactta caaatggaag tacactctan aaccatcatc 120
tatcatggct aaatgtgaga ttagcacagc tgtattattt gtacattgca aacacctaga 180
aagagatggg aaacaaaatc ccaggagttt tgtgtgtgga gtcctgggtt ttccaacaga 240
catcattcca gcattctgag attagggnga ttggggatca ttctggagtt ggaatgttca 300
acaaaagtga tgttgttagg taaaatgtac aacttctgga tctatgcaga cattgaaggt 360
gcaatgagtc tggctttttac tctgctgttt ct                             392

<210> 432
<211> 387
<212> DNA
<213> Homo sapiens

<220>
```

```
<221> misc_feature
<222> (1)...(387)
<223> n = A,T,C or G

<400> 432
ggtatccnta cataatcaaa tatagctgta gtacatgttt tcattggngt agattaccac  60
aaatgcaagg caacatgtgt agatctcttg tcttattctt ttgtctataa tactgtattg 120
ngtagtccaa gctctcggna gtccagccac tgngaaacat gctcccttta gattaacctc 180
gtggacnctn ttgttgnatt gtctgaactg tagngccctg tattttgctt ctgtctgnga 240
attctgttgc ttctggggca tttccttgng atgcagagga ccaccacaca gatgacagca 300
atctgaattg ntccaatcac agctgcgatt aagacatact gaaatcgtac aggaccggga 360
acaacgtata gaacactgga gtccttt                                      387
```

```
<210> 433
<211> 281
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(281)
<223> n = A,T,C or G

<400> 433
ttcaactagc anagaanact gcttcagggn gtgtaaaatg aaaggcttcc acgcagttat  60
ctgattaaag aacactaaga gagggacaag gctagaagcc gcaggatgtc tacactatag 120
caggcnctat ttgggttggc tggaggagct gtggaaaaca tggagagatt ggcgctggag 180
atcgccgtgg ctattcctcn ttgntattac accagngagg ntctctgtnt gcccactggt 240
tnnaaaaccg ntatacaata atgatagaat aggacacaca t                      281
```

```
<210> 434
<211> 484
<212> DNA
<213> Homo sapiens

<400> 434
ttttaaaata agcatttagt gctcagtccc tactgagtac tctttctctc ccctcctctg  60
aatttaattc tttcaacttg caatttgcaa ggattacaca tttcactgtg atgtatattg 120
tgttgcaaaa aaaaaaaagt gtctttgttt aaaattactt ggtttgtgaa tccatcttgc 180
tttttcccca ttggaactag tcattaaccc atctctgaac tggtagaaaa acatctgaag 240
agctagtcta tcagcatctg acaggtgaat tggatggttc tcagaaccat ttcacccaga 300
cagcctgttt ctatcctgtt taataaatta gtttgggttc tctacatgca taacaaaccc 360
tgctccaatc tgtcacataa aagtctgtga cttgaagttt agtcagcacc cccaccaaac 420
tttatttttc tatgtgtttt ttgcaacata tgagtgtttt gaaaataaag tacccatgtc 480
ttta                                                              484
```

```
<210> 435
<211> 424
<212> DNA
<213> Homo sapiens

<400> 435
gcgccgctca gagcaggtca ctttctgcct tccacgtcct ccttcaagga agccccatgt  60
gggtagcttt caatatcgca ggttcttact cctctgcctc tataagctca aacccaccaa 120
cgatcgggca agtaaacccc ctccctcgcc gacttcggaa ctggcgagag ttcagcgcag 180
atgggcctgt gggggagggg caagatagat gaggggggagc ggcatggtgc ggggtgaccc 240
cttggagaga ggaaaaaggc cacaagaggg gctgccaccg ccactaacgg agatggccct 300
ggtagagacc tttgggggtc tggaacctct ggactcccca tgctctaact cccacactct 360
gctatcagaa acttaaactt gaggattttc tctgttttc actcgcaata aattcagagc 420
aaac                                                              424
```

```
<210> 436
```

```
<211> 667
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(667)
<223> n = A,T,C or G

<400> 436
accttgggaa nactctcaca atataaaggg tcgtagactt tactccaaat tccaaaaagg 60
tcctggccat gtaatcctga aagttttccc aaggtagcta taaaatcctt ataagggtgc 120
agcctcttct ggaattcctc tgatttcaaa gtctcactct caagttcttg aaaacgaggg 180
cagttcctga aaggcaggta tagcaactga tcttcagaaa gaggaactgt gtgcaccggg 240
atgggctgcc agagtaggat aggattccag atgctgacac cttctggggg aaacagggct 300
gccaggtttg tcatagcact catcaaagtc cggtcaacgt ctgtgcttcg aatataaacc 360
tgttcatgtt tataggactc attcaagaat tttctatatc tctttcttat atactctcca 420
agttcataat gctgctccat gcccagctgg gtgagttggc caaatccttg tggccatgag 480
gattccttta tggggtcagt gggaaaggtg tcaatgggac ttcggtctcc atgccgaaac 540
accaaagtca caaacttcaa ctccttggct agtacacttc ggtctagcca gaaaaaaagc 600
agaaacaaga agccaaggct aaggcttgct gccctgccag gaggaggggt gcagctctca 660
tgttgag                                                        667

<210> 437
<211> 693
<212> DNA
<213> Homo sapiens

<400> 437
ctacgtctca accctcattt ttaggtaagg aatcttaagt ccaaagatat taagtgactc 60
acacagccag gtaaggaaag ctggattggc acactaggac tctaccatac cgggtttttgt 120
taaagctcag gttaggaggc tgataagctt ggaaggaact tcagacagct ttttcagatc 180
ataaaagata attcttagcc catgttcttc tccagagcag acctgaaatg acagcacagc 240
aggtactcct ctattttcac ccctcttgct tctactctct ggcagtcaga cctgtgggag 300
gccatgggag aaagcagctc tctggatgtt tgtacagatc atggactatt ctctgtggac 360
catttctcca ggttacccta ggtgtcacta ttggggggac agccagcatc tttagctttc 420
atttgagttt ctgtctgtct tcagtagagg aaacttttgc tcttcacact tcacatctga 480
acacctaact gctgttgctc ctgaggtggt gaaagacaga tatagagctt acagtattta 540
tcctatttct aggcactgag ggctgtgggg taccttgtgg tgccaaaaca gatcctgttt 600
taaggacatg ttgcttcaga gatgtctgta actatctggg ggctctgttg gctctttacc 660
ctgcatcatg tgctctcttg gctgaaaatg acc                           693

<210> 438
<211> 360
<212> DNA
<213> Homo sapiens

<400> 438
ctgcttatca caatgaatgt tctcctgggc agcgttgtga tctttgccac cttcgtgact 60
ttatgcaatg catcatgcta tttcatacct aatgagggag ttccaggaga ttcaaccagg 120
atgtttctac acctgtgggt tatgacaaag acaactgcca aagaatcttc aagaaggagg 180
actgcaagta tatctggtgg agaagaagga cccaaaaaag acctgttctg tcagtgaatg 240
gataatctaa tgtgcttcta gtaggcacag ggctcccagg ccaggcctca ttctcctctg 300
gcctctaata gtcaataatt gtgtagccat gcctatcagt aaaaagattt ttgagcaaac 360

<210> 439
<211> 431
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
```

```
<222>  (1)...(431)
<223>  n = A,T,C or G

<400> 439
gttcctnnta actcctgcca gaaacagctc tcctcaacat gagagctgca cccctcctcc 60
tggccagggc agcaagcctt agccttggct tcttgtttct gctttttttc tggctagacc 120
gaagtgtact agccaaggag ttgaagtttg tgactttggt gtttcggcat ggagaccgaa 180
gtcccattga cacctttccc actgacccca taaaggaatc ctcatggcca caaggatttg 240
gccaactcac ccagctgggc atggagcagc attatgaact tggagagtat ataagaaaga 300
gatatagaaa attcttgaat gagtcctata aacatgaaca ggtttatatt cgaagcacag 360
acgttgaccg gactttgatg agtgctatga caaacctggc agcccgtcga cgcggccgcg 420
aatttagtag t                                                    431
```

```
<210> 440
<211> 523
<212> DNA
<213> Homo sapiens
```

```
<400> 440
agagataaag cttaggtcaa agttcataga gttcccatga actatatgac tggccacaca 60
ggatcttttg tatttaagga ttctgagatt ttgcttgagc aggattagat aaggctgttc 120
tttaaatgtc tgaaatggaa cagatttcaa aaaaaaaccc cacaatctag ggtgggaaca 180
aggaaggaaa gatgtgaata ggctgatggg caaaaaacca atttacccat cagttccagc 240
cttctctcaa ggagaggcaa agaaaggaga tacagtggag acatctggaa agttttctcc 300
actggaaaac tgctactatc tgttttttata tttctgttaa aatatatgag gctacagaac 360
taaaaattaa aacctctttg tgtcccttgg tcctggaaca tttatgttcc ttttaaagaa 420
acaaaaatca aactttacag aaagatttga tgtatgtaat acatatagca gctcttgaag 480
tatatatatc atagcaaata agtcatctga tgagaacaag cta                 523
```

```
<210> 441
<211> 430
<212> DNA
<213> Homo sapiens
```

```
<400> 441
gttcctccta actcctgcca gaaacagctc tcctcaacat gagagctgca cccctcctcc 60
tggccagggc agcaagcctt agccttggct tcttgtttct gctttttttc tggctagacc 120
gaagtgtact agccaaggag ttgaagtttg tgactttggt gtttcggcat ggagaccgaa 180
gtcccattga cacctttccc actgacccca taaaggaatc ctcatggcca caaggatttg 240
gccaactcac ccagctgggc atggagcagc attatgaact tggagagtat ataagaaaga 300
gatatagaaa attcttgaat gagtcctata aacatgaaca ggtttatatt cgaagcacag 360
acgttgaccg gactttgatg agtgctatga caaacctggc agcccgtcga cgcggccgcg 420
aatttagtag                                                      430
```

```
<210> 442
<211> 362
<212> DNA
<213> Homo sapiens
```

```
<400> 442
ctaaggaatt agtagtgttc ccatcacttg tttggagtgt gctattctaa aagattttga 60
tttcctggaa tgacaattat attttaactt tggtggggga aagagttata ggaccacagt 120
cttcacttct gatacttgta aattaatctt ttattgcact tgtttttgacc attaagctat 180
atgtttagaa atggtcattt tacggaaaaa ttagaaaaat tctgataata gtgcagaata 240
aatgaattaa tgttttactt aatttatatt gaactgtcaa tgacaaataa aaattctttt 300
tgattatttt ttgttttcat ttaccagaat aaaaactaag aattaaaagt ttgattacag 360
tc                                                              362
```

```
<210> 443
<211> 624
<212> DNA
<213> Homo sapiens
```

141

```
<220>
<221> misc_feature
<222> (1)...(624)
<223> n = A,T,C or G

<400> 443
tttttttttt gcaacacaat atacatcaca gtgaaatgtg taatccttgc aaattgcaag 60
ttgaaagaat taaattcaga ggaggggaga gaaagagtac tcagtaggga ctgagcacta 120
aatgcttatt ttaaaagaaa tgtaaagagc agaaagcaat tcaggctacc ctgccttttg 180
tgctggctag tactccggtc ggtgtcagca gcacgtggca ttgaacattg caatgtggag 240
cccaaaccac agaaaatggg gtgaaattgg ccaactttct attaacttgg cttcctgttt 300
tataaaatat tgtgaataat atcacctact tcaaagggca gttatgaggc ttaaatgaac 360
taacgcctac aaaacactta aacatagata acataggtgc aagtactatg tatctggtac 420
atggtaaaca tccttattat taaagtcaac gctaaaatga atgtgtgtgc atatgctaat 480
agtacagaga gagggcactt aaaccaacta agggcctgga gggaaggttt cctggaaaga 540
ngatgcttgt gctgggtcca aatcttggtc tactatgacc ttggccaaat tatttaaact 600
ttgtccctat ctgctaaaca gatc                                       624

<210> 444
<211> 425
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(425)
<223> n = A,T,C or G

<400> 444
gcacatcatt nntcttgcat tctttgagaa taagaagatc agtaaatagt tcagaagtgg 60
gaagctttgt ccaggcctgt gtgtgaaccc aatgttttgc ttagaaatag aacaagtaag 120
ttcattgcta tagcataaca caaaatttgc ataagtggtg gtcagcaaat ccttgaatgc 180
tgcttaatgt gagaggttgg taaaatcctt tgtgcaacac tctaactccc tgaatgtttt 240
gctgtgctgg gacctgtgca tgccagacaa ggccaagctg gctgaaagag caaccagcca 300
cctctgcaat ctgccacctc ctgctggcag gatttgtttt tgcatcctgt gaagagccaa 360
ggaggcacca gggcataagt gagtagactt atggtcgacg cggccgcgaa tttagtagta 420
gtaga                                                           425

<210> 445
<211> 414
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(414)
<223> n = A,T,C or G

<400> 445
catgtttatg nttttggatt actttgggca cctagtgttt ctaaatcgtc tatcattctt 60
ttctgttttt caaaagcaga gatggccaga gtctcaacaa actgtatctt caagtctttg 120
tgaaattctt tgcatgtggc agattattgg atgtagtttc ctttaactag catataaatc 180
tggtgtgttt cagataaatg aacagcaaaa tgtggtggaa ttaccatttg gaacattgtg 240
aatgaaaaat tgtgtctcta gattatgtaa caaataacta tttcctaacc attgatcttt 300
ggatttttat aatcctactc acaaatgact aggcttctcc tcttgtattt tgaagcagtg 360
tgggtgctgg attgataaaa aaaaaaaaag tcgacgcggc cgcgaattta gtag       414

<210> 446
<211> 631
<212> DNA
<213> Homo sapiens
```

```
<220>
<221> misc_feature
<222> (1)...(631)
<223> n = A,T,C or G

<400> 446
acaaattaga anaaagtgcc agagaacacc acataccttg tccggaacat tacaatggct 60
tctgcatgca tgggaagtgt gagcattcta tcaatatgca ggagccatct tgcaggtgtg 120
atgctggtta tactggacaa cactgtgaaa aaaaggacta cagtgttcta tacgttgttc 180
ccggtcctgt acgatttcag tatgtcttaa tcgcagctgt gattggaaca attcagattg 240
ctgtcatctg tgtggtggtc ctctgcatca caagggccaa actttaggta atagcattgg 300
actgagattt gtaaactttc caaccttcca ggaaatgccc cagaagcaac agaattcaca 360
gacagaagca aaatacaggg cactacagtt cagacaatac aacaagagcg tccacgaggt 420
taatctaaag ggagcatgtt tcacagtggc tggactaccg agagcttgga ctacacaata 480
cagtattata gacaaaagaa taagacaaga gatctacaca tgttgccttg catttgtggt 540
aatctacacc aatgaaaaca tgtactacag ctatatttga ttatgtatgg atatatttga 600
aatagtatac attgtcttga tgtttttct g                                 631
```

```
<210> 447
<211> 585
<212> DNA
<213> Homo sapiens
```

```
<220>
<221> misc_feature
<222> (1)...(585)
<223> n = A,T,C or G

<400> 447
ccttgggaaa antntcacaa tataaagggt cgtagacttt actccaaatt ccaaaaaggt 60
cctggccatg taatcctgaa agttttccca aggtagctat aaaatcctta taagggtgca 120
gcctcttctg gaattcctct gatttcaaag tctcactctc aagttcttga aaacgagggc 180
agttcctgaa aggcaggtat agcaactgat cttcagaaag aggaactgtg tgcaccggga 240
tgggctgcca gagtaggata ggattccaga tgctgacacc ttctggggga aacagggctg 300
ccaggtttgt catagcactc atcaaagtcc ggtcaacgtc tgtgcttcga atataaacct 360
gttcatgttt ataggactca ttcaagaatt ttctatatct ctttcttata tactctccaa 420
gttcataatg ctgctccatg cccagctggg tgagttggcc aaatccttgt ggccatgagg 480
attcctttat ggggtcagtg ggaaaggtgt caatgggact tcggtctcca tgccgaaaca 540
ccaaagtcac aaacttcaac tccttggcta gtacacttcg gtcta               585
```

```
<210> 448
<211> 93
<212> DNA
<213> Homo sapiens
```

```
<220>
<221> misc_feature
<222> (1)...(93)
<223> n = A,T,C or G

<400> 448
tgctcgtggg tcattctgan nnccgaactg accntgccag ccctgccgan gggccnccat 60
ggctccctag tgccctggag aggangggc tag                            93
```

```
<210> 449
<211> 706
<212> DNA
<213> Homo sapiens
```

```
<220>
<221> misc_feature
```

```
<222> (1)...(706)
<223> n = A,T,C or G

<400> 449
ccaagttcat gctntgtgct ggacgctgga caggggggcaa aagcnnttgc tcgtgggtca 60
ttctgancac cgaactgacc atgccagccc tgccgatggt cctccatggc tccctagtgc 120
cctggagagg aggtgtctag tcagagagta gtcctggaag gtggcctctg ngaggagcca 180
cggggacagc atcctgcaga tggtcgggcg cgtcccattc gccattcagg ctgcgcaact 240
gttgggaagg gcgatcggtg cgggcctctt cgctattacg ccagctggcg aaaggggggat 300
gtgctgcaag gcgattaagt tgggtaacgc caggggttttc ccagtcncga cgttgtaaaa 360
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cgtacgtaag cttggatcct ctagagcggc cgcctactac tactaaattc gcggccgcgt 480
cgacgtggga tccncactga gagagtggag agtgacatgt gctggacnct gtccatgaag 540
cactgagcag aagctggagg cacaacgcnc cagacactca cagctactca ggaggctgag 600
aacaggttga acctgggagg tggaggttgc aatgagctga gatcaggccn ctgcncccca 660
gcatggatga cagagtgaaa ctccatctta aaaaaaaaaa aaaaaa 706

<210> 450
<211> 493
<212> DNA
<213> Homo sapiens

<400> 450
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acagttttaa aaggtaaaac aacataaaaa gaaatatcct atagtggaaa taagagagtc 120
aaatgaggct gagaacttta caaagggatc ttacagacat gtcgccaata tcactgcatg 180
agcctaagta taagaacaac ctttggggag aaaccatcat ttgacagtga ggtacaattc 240
caagtcaggt agtgaaatgg gtggaattaa actcaaatta atcctgccag ctgaaacgca 300
agagacactg tcagagagtt aaaaagtgag ttctatccat gaggtgattc cacagtcttc 360
tcaagtcaac acatctgtga actcacagac caagttctta aaccactgtt caaactctgc 420
tacacatcag aatcacctgg agagctttac aaactcccat tgccgagggt cgacgcggcc 480
gcgaatttag tag 493

<210> 451
<211> 501
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(501)
<223> n = A,T,C or G

<400> 451
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ctcttcgcta ttacgccagc tggcgaaagg gggatgtgct gcaaggcgat taagttgggt 120
aacgccaggg ttttcccagt cncgacgttg taaaacgacg gccagtgaat tgaatttagg 180
tgacnctata gaagagctat gacgtcgcat gcacgcgtac gtaagcttgg atcctctaga 240
gcggccgcct actactacta aattcgcggc cgcgtcgacg tgggatccnc actgagagag 300
tggagagtga catgtgctgg acnctgtcca tgaagcactg agcagaagct ggaggcacaa 360
cgcnccagac actcacagct actcaggagg ctgagaacag gttgaacctg ggaggtggag 420
gttgcaatga gctgagatca ggccnctgcn ccccagcatg gatgacagag tgaaactcca 480
tcttaaaaaa aaaaaaaaaa a 501

<210> 452
<211> 51
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(51)
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<223> n = A,T,C or G

<400> 452
agacggtttc accnttacaa cnccttttag gatgggnntt ggggagcaag c          51

<210> 453
<211> 317
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(317)
<223> n = A,T,C or G

<400> 453
tacatcttgc ttttttcccca ttggaactag tcattaaccc atctctgaac tggtagaaaa 60
acatctgaag agctagtcta tcagcatctg gcaagtgaat tggatggttc tcagaaccat 120
ttcacccana cagcctgttt ctatcctgtt taataaatta gtttgggttc tctacatgca 180
taacaaaccc tgctccaatc tgtcacataa aagtctgtga cttgaagttt antcagcacc 240
cccaccaaac tttattttttc tatgtgtttt ttgcaacata tgagtgtttt gaaaataagg 300
tacccatgtc tttatta                                                317

<210> 454
<211> 231
<212> DNA
<213> Homo sapiens

<400> 454
ttcgaggtac aatcaactct cagagtgtag tttccttcta tagatgagtc agcattaata 60
taagccacgc cacgctcttg aaggagtctt gaattctcct ctgctcactc agtagaacca 120
agaagaccaa attcttctgc atcccagctt gcaaacaaaa ttgttcttct aggtctccac 180
ccttcctttt tcagtgttcc aaagctcctc acaatttcat gaacaacagc t            231

<210> 455
<211> 231
<212> DNA
<213> Homo sapiens

<400> 455
taccaaagag ggcataataa tcagtctcac agtagggttc accatcctcc aagtgaaaaa 60
cattgttccg aatgggcttt ccacaggcta cacacacaaa acaggaaaca tgccaagttt 120
gtttcaacgc attgatgact tctccaagga tcttcctttg gcatcgacca cattcagggg 180
caaagaattt ctcatagcac agctcacaat acagggctcc tttctcctct a            231

<210> 456
<211> 231
<212> DNA
<213> Homo sapiens

<400> 456
ttggcaggta cccttacaaa gaagacacca taccttatgc gttattaggt ggaataatca 60
ttccattcag tattatcgtt attattcttg gagaaaccct gtctgtttac tgtaacctt 120
tgcactcaaa ttcctttatc aggaataact acatagccac tatttacaaa gccattggaa 180
ccttttttatt tggtgcagct gctagtcagt ccctgactga cattgccaag t            231

<210> 457
<211> 231
<212> DNA
<213> Homo sapiens

<220>
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<221> misc_feature
<222> (1)...(231)
<223> n = A,T,C or G

<400> 457
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gcattcctta atatgatctt gctataatta gatttttctc cattagagtt catacagttt 120
tatttgattt tattagcaat ctctttcaga agacccttga gatcattaag ctttgtatcc 180
agttgtctaa atcgatgcct catttcctct gaggtgtcgc tggctttgt g            231


<210> 458
<211> 231
<212> DNA
<213> Homo sapiens


<400> 458
aggtctggtt cccccactt ccactcccct ctactctctc taggactggg ctgggccaag 60
agaagagggg tggttaggga agccgttgag acctgaagcc ccaccctcta ccttccttca 120
acaccctaac cttgggtaac agcatttgga attatcattt gggatgagta gaatttccaa 180
ggtcctgggt taggcatttt ggggggccag accccaggag aagaagattc t            231


<210> 459
<211> 231
<212> DNA
<213> Homo sapiens


<400> 459
ggtaccgagg ctcgctgaca cagagaaacc ccaacgcgag gaaaggaatg gccagccaca 60
ccttcgcgaa acctgtggtg gcccaccagt cctaacggga caggacagag agacagagca 120
gccctgcact gttttccctc caccacagcc atcctgtccc tcattggctc tgtgctttcc 180
actatacaca gtcaccgtcc caatgagaaa caagaaggag caccctccac a            231


<210> 460
<211> 231
<212> DNA
<213> Homo sapiens


<400> 460
gcaggtataa catgctgcaa caacagatgt gactaggaac ggccggtgac atggggaggg 60
cctatcaccc tattcttggg ggctgcttct tcacagtgat catgaagcct agcagcaaat 120
cccacctccc cacacgcaca cggccagcct ggagcccaca gaagggtcct cctgcagcca 180
gtggagcttg gtccagcctc cagtccaccc ctaccaggct taaggataga a            231


<210> 461
<211> 231
<212> DNA
<213> Homo sapiens


<400> 461
cgaggtttga gaagctctaa tgtgcagggg agccgagaag caggcggcct agggagggtc 60
gcgtgtgctc cagaagagtg tgtgcatgcc agaggggaaa caggcgcctg tgtgtcctgg 120
gtggggttca gtgaggagtg ggaaattggt tcagcagaac caagccgttg ggtgaataag 180
aggggggattc catggcactg atagagccct atagtttcag agctgggaat t           231


<210> 462
<211> 231
<212> DNA
<213> Homo sapiens


<400> 462
aggtaccctc attgtagcca tgggaaaatt gatgttcagt ggggatcagt gaattaaatg 60
gggtcatgca agtataaaaa ttaaaaaaaa aagacttcat gcccaatctc atatgatgtg 120
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146

```
gaagaactgt tagagagacc aacagggtag tgggttagag atttccagag tcttacattt 180
tctagaggag gtatttaatt tcttctcact catccagtgt tgtatttagg a           231
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<210> 463
<211> 231
<212> DNA
<213> Homo sapiens

<400> 463
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actgagtaga caggtgtcct cttggcatgg taagtcttaa gtcccctccc agatctgtga 120
catttgacag gtgtcttttc ctctggacct cggtgtcccc atctgagtga gaaaggcag 180
tggggaggtg gatcttccag tcgaagcggt atagaagccc gtgtgaaaag c           231
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<210> 464
<211> 231
<212> DNA
<213> Homo sapiens

<400> 464
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gtactctaag attttatcta agttgccttt tctgggtggg aaagtttaac cttagtgact 60
aaggacatca catatgaaga atgtttaagt tggaggtggc aacgtgaatt gcaaacaggg 120
cctgcttcag tgactgtgtg cctgtagtcc cagctactcg ggagtctgtg tgaggccagg 180
ggtgccagcg caccagctag atgctctgta acttctaggc cccattttcc c           231
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<210> 465
<211> 231
<212> DNA
<213> Homo sapiens

<400> 465
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catgttgttg tagctgtggt aatgctggct gcatctcaga cagggttaac ttcagctcct 60
gtggcaaatt agcaacaaat tctgacatca tatttatggt ttctgtatct ttgttgatga 120
aggatggcac aatttttgct tgtgttcata atatactcag attagttcag ctccatcaga 180
taaactggag acatgcagga cattagggta gtgttgtagc tctggtaatg a           231
```

<210> 466
<211> 231
<212> DNA
<213> Homo sapiens

<400> 466
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ggccttcgaa cagaacttgc cacataccca ggtataatag tttctaacat ttgcccagga 120
cctgtgcaat caaatattgt ggagaattcc ctagctggag aagtcacaaa gactataggc 180
aataatggag accagtccca caagatgaca accagtcgtt gtgtgcggct g           231
```

<210> 467
<211> 311
<212> DNA
<213> Homo sapiens

<400> 467
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tgtgccttaa cagaaggtct tgagattcta agtgggaatc atttcagtga ctgtcatggg 180
gcatgggtct ctgcccaagc tcgtaatgag actatagcaa ggcggctgtg ggacgtcagt 240
tgtgacctgc tgggcctccc aatagactaa caggcagtgc cagttggacc caagagaaga 300
ctgcagcaga c                                                       311
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<210> 468
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147

<212> DNA
<213> Homo sapiens

<400> 468
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aagatctgca tggtgggaag gacctgatga tacagagttt gataggagac aattaaaggc 120
tggaaggcac tggatgcctg atgatgaagt ggactttcaa actggggcac tactgaaacg 180
atgggatggc cagagacaca ggagatgagt tggagcaagc tcaataacaa agtggttcaa 240
cgaggacttg gaattgcatg gagctggagc tgaagtttag cccaattgtt tactagttga 300
gtgaatgtgg atgattggat gatcatttct catctctgag cctcaggttc cccatccata 360
aaatgggata cacagtatga tctataaagt gggatatagt atgatctact tcactgggtt 420
atttgaagga tgaattgaga taatttattt caggtgccta gaacaatgcc cagattagta 480
catttggtgg aactgagaaa tggcataaca ccaaatttaa tatatgtcag atgttactat 540
gattatcatt caatctcata gttttgtcat ggcccaattt atcctcactt gtgcctcaac 600
aaattgaact gttaacaaag gaatctctgg tcctgggtaa tggctgagca ccactgagca 660
tttccattcc agttggcttc ttgggtttgc tagctgcatc actagtcatc ttaaataaat 720
gaagttttaa catttctcca gtgattttt tatctcacct ttgaagatac tatgttatgt 780
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<210> 469
<211> 2229
<212> DNA
<213> Homo sapiens

148

<400> 469
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                                                                     2229

<210> 470
<211> 2426
<212> DNA
<213> Homo sapiens

<400> 470
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caaaattcta aagcgcactc accatgaaat ggataaaggt tacctttggg gatttgcact 180
gcatgaattc tgtgaaaagc ttgttggata ttgtgataga gatagagaaa tgaagtatat 240
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atggcaaggt gtcagcatac cctgaacttg agttgagagc tacacacaat attattggtt 1860
tccgagcatc acaaacaccc tctctgtttc ttcactgggc acagaatttt aatacttatt 1920
tcagtgggct gttggcagga acaaatgaag caatctacat aaagtcacta gtgcagtgcc 1980
tgacacacac cattctcttg aggtcccctc tagagatccc acaggtcata tgacttcttg 2040
gggagcagtg gctcacacct gtaatcccag cactttggga ggctgaggca ggtgggtcac 2100
ctgaggtcag gagttcaaga ccagcctggc caatatggtg aaaccccatc tctactaaaa 2160
atacaaaaat tagctgggcg tgctggtgca tgcctgtaat cccagctact tgggaggctg 2220
aggcaggaga attgctggaa catgggaggc ggaggttgca gtgagctgta attgtgccat 2280
tgcactcgaa cctgggcgac agagtggaac tctgtttcca aaaaacaaac aaacaaaaaa 2340
ggcatagtca gatacaacgt gggtgggatg tgtaaataga agcaggatat aaagggcatg 2400
gggtgacggt tttgcccaac acaatg                                      2426
```

<210> 471
<211> 812
<212> DNA
<213> Homo sapiens

<400> 471
```
gaacaaaatg agtaatgtta ttctacagtg tagaaaggtc acagtacaga tctgggaact 60
aaatattaaa aatgagtgtg gctggatata tggagaatgt tgggcccaga aggaaccgta 120
gagatcagat attacaacag ctttgttttg agggttagaa atatgaaatg atttggttat 180
gaacgcacag tttaggcagc agggccagaa tcctgaccct ctgccccgtg gttatctcct 240
cccagcttg gctgcctcat gtcatcacag tattccattt tgtttgttgc atgtcttgtg 300
aagccatcaa gattttctcg tctgttttcc tctcattggt aatgctcact ttgtgacttc 360
atttcaaatc tgtaatcccg ttcaaataaa tatccacaac aggatctgtt ttcctgccca 420
tcctttaagg aacacatcaa ttcattttct aatgtccttc cctcacaagc gggaccaggc 480
acaggcgag gctcatcgat gacccaagat ggcggccggg catttctccc agggatctct 540
gtgcttcctt ttgtgcttcc tgtgtgtgtg gatatttaaa ggggctggaa atgtgcaaaa 600
acatgtcact acttagacat tatattgtca tcttgctgtt tctagtgatg ttaattatct 660
ccatttcagc agatgtgtgg cctcagatgg taaagtcagc agcctttctt attttctcacc 720
tctgtatcat caggtccttc ccaccatgca gatcttcctg gtctccctcg gctgcagcca 780
cacaaatctc ccctctgttt ttctgatgcc ag                                812
```

<210> 472
<211> 515
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (1)...(515)
<223> n = A,T,C or G

<400> 472
```
acggagactt attttctgat attgtctgca tatgtatgtt tttaagagtc tggaaatagt 60
cttatgactt tcctatcatg cttattaata aataatacag cccagagaag atgaaaatgg 120
gttccagaat tattggtcct tgcagccgg tgaatctcag caagaggaac caccaactga 180
caatcaggat attgaacctg gacaagagag agaaggaaca cctccgatcg aagaacgtaa 240
```

```
agtagaaggt gattgccagg aaatggatct ggaaaagact cggagtgagc gtggagatgg 300
ctctgatgta aaagagaaga ctccacctaa tcctaagcat gctaagacta aagaagcagg 360
agatgggcag ccataagtta aaaagaagac aagctgaagc tacacacatg gctgatgtca 420
cattgaaaat gtgactgaaa atttgaaaat tctctcaata aagtttgagt tttctctgaa 480
gaaaaaaaaa naaaaaaaaa aaanaaaaan aaaaa                               515
```

<210> 473
<211> 750
<212> PRT
<213> Homo sapiens

<400> 473

```
Met Trp Asn Leu Leu His Glu Thr Asp Ser Ala Val Ala Thr Ala Arg
              5                  10                  15

Arg Pro Arg Trp Leu Cys Ala Gly Ala Leu Val Leu Ala Gly Gly Phe
            20                  25                  30

Phe Leu Leu Gly Phe Leu Phe Gly Trp Phe Ile Lys Ser Ser Asn Glu
        35                  40                  45

Ala Thr Asn Ile Thr Pro Lys His Asn Met Lys Ala Phe Leu Asp Glu
    50                  55                  60

Leu Lys Ala Glu Asn Ile Lys Lys Phe Leu Tyr Asn Phe Thr Gln Ile
65                  70                  75                  80

Pro His Leu Ala Gly Thr Glu Gln Asn Phe Gln Leu Ala Lys Gln Ile
            85                  90                  95

Gln Ser Gln Trp Lys Glu Phe Gly Leu Asp Ser Val Glu Leu Ala His
            100                 105                 110

Tyr Asp Val Leu Leu Ser Tyr Pro Asn Lys Thr His Pro Asn Tyr Ile
        115                 120                 125

Ser Ile Ile Asn Glu Asp Gly Asn Glu Ile Phe Asn Thr Ser Leu Phe
    130                 135                 140

Glu Pro Pro Pro Gly Tyr Glu Asn Val Ser Asp Ile Val Pro Pro
145                 150                 155                 160

Phe Ser Ala Phe Ser Pro Gln Gly Met Pro Glu Gly Asp Leu Val Tyr
            165                 170                 175

Val Asn Tyr Ala Arg Thr Glu Asp Phe Phe Lys Leu Glu Arg Asp Met
            180                 185                 190

Lys Ile Asn Cys Ser Gly Lys Ile Val Ile Ala Arg Tyr Gly Lys Val
        195                 200                 205

Phe Arg Gly Asn Lys Val Lys Asn Ala Gln Leu Ala Gly Ala Lys Gly
    210                 215                 220

Val Ile Leu Tyr Ser Asp Pro Ala Asp Tyr Phe Ala Pro Gly Val Lys
225                 230                 235                 240

Ser Tyr Pro Asp Gly Trp Asn Leu Pro Gly Gly Gly Val Gln Arg Gly
            245                 250                 255

Asn Ile Leu Asn Leu Asn Gly Ala Gly Asp Pro Leu Thr Pro Gly Tyr
```

```
            260                    · 265                    270

Pro Ala Asn Glu Tyr Ala Tyr Arg Arg Gly Ile Ala Glu Ala Val Gly
        275                 280                 285

Leu Pro Ser Ile Pro Val His Pro Ile Gly Tyr Tyr Asp Ala Gln Lys
        290                 295                 300

Leu Leu Glu Lys Met Gly Gly Ser Ala Pro Pro Asp Ser Ser Trp Arg
305                 310                 315                 320

Gly Ser Leu Lys Val Pro Tyr Asn Val Gly Pro Gly Phe Thr Gly Asn
                325                 330                 335

Phe Ser Thr Gln Lys Val Lys Met His Ile His Ser Thr Asn Glu Val
                340                 345                 350

Thr Arg Ile Tyr Asn Val Ile Gly Thr Leu Arg Gly Ala Val Glu Pro
        355                 360                 365

Asp Arg Tyr Val Ile Leu Gly Gly His Arg Asp Ser Trp Val Phe Gly
        370                 375                 380

Gly Ile Asp Pro Gln Ser Gly Ala Ala Val Val His Glu Ile Val Arg
385                 390                 395                 400

Ser Phe Gly Thr Leu Lys Lys Glu Gly Trp Arg Pro Arg Arg Thr Ile
                405                 410                 415

Leu Phe Ala Ser Trp Asp Ala Glu Glu Phe Gly Leu Leu Gly Ser Thr
                420                 425                 430

Glu Trp Ala Glu Glu Asn Ser Arg Leu Leu Gln Glu Arg Gly Val Ala
        435                 440                 445

Tyr Ile Asn Ala Asp Ser Ser Ile Glu Gly Asn Tyr Thr Leu Arg Val
        450                 455                 460

Asp Cys Thr Pro Leu Met Tyr Ser Leu Val His Asn Leu Thr Lys Glu
465                 470                 475                 480

Leu Lys Ser Pro Asp Glu Gly Phe Glu Gly Lys Ser Leu Tyr Glu Ser
                485                 490                 495

Trp Thr Lys Lys Ser Pro Ser Pro Glu Phe Ser Gly Met Pro Arg Ile
                500                 505                 510

Ser Lys Leu Gly Ser Gly Asn Asp Phe Glu Val Phe Phe Gln Arg Leu
                515                 520                 525

Gly Ile Ala Ser Gly Arg Ala Arg Tyr Thr Lys Asn Trp Glu Thr Asn
        530                 535                 540

Lys Phe Ser Gly Tyr Pro Leu Tyr His Ser Val Tyr Glu Thr Tyr Glu
545                 550                 555                 560

Leu Val Glu Lys Phe Tyr Asp Pro Met Phe Lys Tyr His Leu Thr Val
                565                 570                 575

Ala Gln Val Arg Gly Gly Met Val Phe Glu Leu Ala Asn Ser Ile Val
                580                 585                 590
```

```
Leu Pro Phe Asp Cys Arg Asp Tyr Ala Val Val Leu Arg Lys Tyr Ala
        595             600             605

Asp Lys Ile Tyr Ser Ile Ser Met Lys His Pro Gln Glu Met Lys Thr
    610             615             620

Tyr Ser Val Ser Phe Asp Ser Leu Phe Ser Ala Val Lys Asn Phe Thr
625             630             635             640

Glu Ile Ala Ser Lys Phe Ser Glu Arg Leu Gln Asp Phe Asp Lys Ser
                645             650             655

Asn Pro Ile Val Leu Arg Met Met Asn Asp Gln Leu Met Phe Leu Glu
            660             665             670

Arg Ala Phe Ile Asp Pro Leu Gly Leu Pro Asp Arg Pro Phe Tyr Arg
        675             680             685

His Val Ile Tyr Ala Pro Ser Ser His Asn Lys Tyr Ala Gly Glu Ser
    690             695             700

Phe Pro Gly Ile Tyr Asp Ala Leu Phe Asp Ile Glu Ser Lys Val Asp
705             710             715             720

Pro Ser Lys Ala Trp Gly Glu Val Lys Arg Gln Ile Tyr Val Ala Ala
            725             730             735

Phe Thr Val Gln Ala Ala Ala Glu Thr Leu Ser Glu Val Ala
            740             745             750
```

```
<210> 474
<211> 386
<212> PRT
<213> Homo sapiens

<400> 474
Met Arg Ala Ala Pro Leu Leu Leu Ala Arg Ala Ala Ser Leu Ser Leu
                5              10             15

Gly Phe Leu Phe Leu Leu Phe Phe Trp Leu Asp Arg Ser Val Leu Ala
        20             25             30

Lys Glu Leu Lys Phe Val Thr Leu Val Phe Arg His Gly Asp Arg Ser
    35             40             45

Pro Ile Asp Thr Phe Pro Thr Asp Pro Ile Lys Glu Ser Ser Trp Pro
    50             55             60

Gln Gly Phe Gly Gln Leu Thr Gln Leu Gly Met Glu Gln His Tyr Glu
65             70             75             80

Leu Gly Glu Tyr Ile Arg Lys Arg Tyr Arg Lys Phe Leu Asn Glu Ser
            85             90             95

Tyr Lys His Glu Gln Val Tyr Ile Arg Ser Thr Asp Val Asp Arg Thr
        100            105            110

Leu Met Ser Ala Met Thr Asn Leu Ala Ala Leu Phe Pro Pro Glu Gly
        115            120            125

Val Ser Ile Trp Asn Pro Ile Leu Leu Trp Gln Pro Ile Pro Val His
```

```
        130              135              140

Thr Val Pro Leu Ser Glu Asp Gln Leu Leu Tyr Leu Pro Phe Arg Asn
145             150             155             160

Cys Pro Arg Phe Gln Glu Leu Glu Ser Glu Thr Leu Lys Ser Glu Glu
            165             170             175

Phe Gln Lys Arg Leu His Pro Tyr Lys Asp Phe Ile Ala Thr Leu Gly
        180             185             190

Lys Leu Ser Gly Leu His Gly Gln Asp Leu Phe Gly Ile Trp Ser Lys
        195             200             205

Val Tyr Asp Pro Leu Tyr Cys Glu Ser Val His Asn Phe Thr Leu Pro
    210             215             220

Ser Trp Ala Thr Glu Asp Thr Met Thr Lys Leu Arg Glu Leu Ser Glu
225             230             235             240

Leu Ser Leu Leu Ser Leu Tyr Gly Ile His Lys Gln Lys Glu Lys Ser
            245             250             255

Arg Leu Gln Gly Gly Val Leu Val Asn Glu Ile Leu Asn His Met Lys
        260             265             270

Arg Ala Thr Gln Ile Pro Ser Tyr Lys Lys Leu Ile Met Tyr Ser Ala
        275             280             285

His Asp Thr Thr Val Ser Gly Leu Gln Met Ala Leu Asp Val Tyr Asn
    290             295             300

Gly Leu Leu Pro Pro Tyr Ala Ser Cys His Leu Thr Glu Leu Tyr Phe
305             310             315             320

Glu Lys Gly Glu Tyr Phe Val Glu Met Tyr Tyr Arg Asn Glu Thr Gln
            325             330             335

His Glu Pro Tyr Pro Leu Met Leu Pro Gly Cys Ser Pro Ser Cys Pro
        340             345             350

Leu Glu Arg Phe Ala Glu Leu Val Gly Pro Val Ile Pro Gln Asp Trp
        355             360             365

Ser Thr Glu Cys Met Thr Thr Asn Ser His Gln Gly Thr Glu Asp Ser
    370             375             380

Thr Asp
385


<210> 475
<211> 261
<212> PRT
<213> Homo sapiens

<400> 475
Met Trp Val Pro Val Val Phe Leu Thr Leu Ser Val Thr Trp Ile Gly
            5               10              15

Ala Ala Pro Leu Ile Leu Ser Arg Ile Val Gly Gly Trp Glu Cys Glu
        20              25              30
```

```
        Lys His Ser Gln Pro Trp Gln Val Leu Val Ala Ser Arg Gly Arg Ala
                35                  40                  45

        Val Cys Gly Gly Val Leu Val His Pro Gln Trp Val Leu Thr Ala Ala
            50                  55                  60

        His Cys Ile Arg Asn Lys Ser Val Ile Leu Leu Gly Arg His Ser Leu
        65                  70                  75                  80

        Phe His Pro Glu Asp Thr Gly Gln Val Phe Gln Val Ser His Ser Phe
                        85                  90                  95

        Pro His Pro Leu Tyr Asp Met Ser Leu Leu Lys Asn Arg Phe Leu Arg
                    100                 105                 110

        Pro Gly Asp Asp Ser Ser His Asp Leu Met Leu Leu Arg Leu Ser Glu
                    115                 120                 125

        Pro Ala Glu Leu Thr Asp Ala Val Lys Val Met Asp Leu Pro Thr Gln
                    130                 135                 140

        Glu Pro Ala Leu Gly Thr Thr Cys Tyr Ala Ser Gly Trp Gly Ser Ile
        145                 150                 155                 160

        Glu Pro Glu Glu Phe Leu Thr Pro Lys Lys Leu Gln Cys Val Asp Leu
                        165                 170                 175

        His Val Ile Ser Asn Asp Val Cys Ala Gln Val His Pro Gln Lys Val
                    180                 185                 190

        Thr Lys Phe Met Leu Cys Ala Gly Arg Trp Thr Gly Gly Lys Ser Thr
                195                 200                 205

        Cys Ser Gly Asp Ser Gly Gly Pro Leu Val Cys Asn Gly Val Leu Gln
            210                 215                 220

        Gly Ile Thr Ser Trp Gly Ser Glu Pro Cys Ala Leu Pro Glu Arg Pro
        225                 230                 235                 240

        Ser Leu Tyr Thr Lys Val Val His Tyr Arg Lys Trp Ile Lys Asp Thr
                    245                 250                 255

        Ile Val Ala Asn Pro
                    260


<210> 476
<211> 1079
<212> PRT
<213> Homo sapiens

<400> 476
Met His His His His His His Met Trp Val Pro Val Val Phe Leu Thr
                  5                  10                  15

Leu Ser Val Thr Trp Ile Gly Ala Ala Pro Leu Ile Leu Ser Arg Ile
              20                  25                  30

Val Gly Gly Trp Glu Cys Glu Lys His Ser Gln Pro Trp Gln Val Leu
        35                  40                  45
```

155

```
Val Ala Ser Arg Gly Arg Ala Val Cys Gly Gly Val Leu Val His Pro
    50              55                  60

Gln Trp Val Leu Thr Ala Ala His Cys Ile Arg Asn Lys Ser Val Ile
65              70                  75                      80

Leu Leu Gly Arg His Ser Leu Phe His Pro Glu Asp Thr Gly Gln Val
            85                  90                  95

Phe Gln Val Ser His Ser Phe Pro His Pro Leu Tyr Asp Met Ser Leu
            100                 105                 110

Leu Lys Asn Arg Phe Leu Arg Pro Gly Asp Asp Ser Ser His Asp Leu
            115                 120                 125

Met Leu Leu Arg Leu Ser Glu Pro Ala Glu Leu Thr Asp Ala Val Lys
    130             135                 140

Val Met Asp Leu Pro Thr Gln Glu Pro Ala Leu Gly Thr Thr Cys Tyr
145                 150                 155                 160

Ala Ser Gly Trp Gly Ser Ile Glu Pro Glu Glu Phe Leu Thr Pro Lys
            165                 170                 175

Lys Leu Gln Cys Val Asp Leu His Val Ile Ser Asn Asp Val Cys Ala
            180                 185                 190

Gln Val His Pro Gln Lys Val Thr Lys Phe Met Leu Cys Ala Gly Arg
    195                 200                 205

Trp Thr Gly Gly Lys Ser Thr Cys Ser Gly Asp Ser Gly Gly Pro Leu
    210                 215                 220

Val Cys Asn Gly Val Leu Gln Gly Ile Thr Ser Trp Gly Ser Glu Pro
225                 230                 235                 240

Cys Ala Leu Pro Glu Arg Pro Ser Leu Tyr Thr Lys Val Val His Tyr
            245                 250                 255

Arg Lys Trp Ile Lys Asp Thr Ile Val Ala Asn Pro Gly Ser Met Ala
            260                 265                 270

Thr Ala Gly Asn Pro Trp Gly Trp Phe Leu Gly Tyr Leu Ile Leu Gly
            275                 280                 285

Val Ala Gly Ser Leu Val Ser Gly Ser Cys Ser Gln Ile Ile Asn Gly
    290                 295                 300

Glu Asp Cys Ser Pro His Ser Gln Pro Trp Gln Ala Ala Leu Val Met
305                 310                 315                 320

Glu Asn Glu Leu Phe Cys Ser Gly Val Leu Val His Pro Gln Trp Val
            325                 330                 335

Leu Ser Ala Ala His Cys Phe Gln Asn Ser Tyr Thr Ile Gly Leu Gly
            340                 345                 350

Leu His Ser Leu Glu Ala Asp Gln Glu Pro Gly Ser Gln Met Val Glu
    355                 360                 365

Ala Ser Leu Ser Val Arg His Pro Glu Tyr Asn Arg Pro Leu Leu Ala
    370                 375                 380
```

```
Asn Asp Leu Met Leu Ile Lys Leu Asp Glu Ser Val Ser Glu Ser Asp
385             390             395                         400

Thr Ile Arg Ser Ile Ser Ile Ala Ser Gln Cys Pro Thr Ala Gly Asn
            405             410                 415

Ser Cys Leu Val Ser Gly Trp Gly Leu Leu Ala Asn Gly Arg Met Pro
            420'                425                 430

Thr Val Leu Gln Cys Val Asn Val Ser Val Val Ser Glu Glu Val Cys
        435                 440                 445

Ser Lys Leu Tyr Asp Pro Leu Tyr His Pro Ser Met Phe Cys Ala Gly
    450                 455                 460

Gly Gly Gln Asp Gln Lys Asp Ser Cys Asn Gly Asp Ser Gly Gly Pro
465                 470             475                     480

Leu Ile Cys Asn Gly Tyr Leu Gln Gly Leu Val Ser Phe Gly Lys Ala
            485                 490                 495

Pro Cys Gly Gln Val Gly Val Pro Gly Val Tyr Thr Asn Leu Cys Lys
        500                 505                 510

Phe Thr Glu Trp Ile Glu Lys Thr Val Gln Ala Ser Glu Phe Met Val
        515                 520                 525

Gln Arg Leu Trp Val Ser Arg Leu Leu Arg His Arg Lys Ala Gln Leu
    530                 535                 540

Leu Leu Val Asn Leu Leu Thr Phe Gly Leu Glu Val Cys Leu Ala Ala
545                 550             555                     560

Gly Ile Thr Tyr Val Pro Pro Leu Leu Leu Glu Val Gly Val Glu Glu
            565                 570                 575

Lys Phe Met Thr Met Val Leu Gly Ile Gly Pro Val Leu Gly Leu Val
            580                 585                 590

Cys Val Pro Leu Leu Gly Ser Ala Ser Asp His Trp Arg Gly Arg Tyr
        595                 600                 605

Gly Arg Arg Arg Pro Phe Ile Trp Ala Leu Ser Leu Gly Ile Leu Leu
    610                 615                 620

Ser Leu Phe Leu Ile Pro Arg Ala Gly Trp Leu Ala Gly Leu Leu Cys
625                 630                 635                     640

Pro Asp Pro Arg Pro Leu Glu Leu Ala Leu Leu Ile Leu Gly Val Gly
                645                 650                 655

Leu Leu Asp Phe Cys Gly Gln Val Cys Phe Thr Pro Leu Glu Ala Leu
            660                 665                 670

Leu Ser Asp Leu Phe Arg Asp Pro Asp His Cys Arg Gln Ala Tyr Ser
        675                 680                 685

Val Tyr Ala Phe Met Ile Ser Leu Gly Gly Cys Leu Gly Tyr Leu Leu
    690                 695                 700

Pro Ala Ile Asp Trp Asp Thr Ser Ala Leu Ala Pro Tyr Leu Gly Thr
```

157

705					710				715				720
Gln	Glu	Glu	Cys	Leu	Phe	Gly	Leu	Leu	Thr	Leu	Ile	Phe	Leu	Thr	Cys

```
705                     710                 715                     720

Gln Glu Glu Cys Leu Phe Gly Leu Leu Thr Leu Ile Phe Leu Thr Cys
                725             730                 735

Val Ala Ala Thr Leu Leu Val Ala Glu Glu Ala Ala Leu Gly Pro Thr
                740             745                 750

Glu Pro Ala Glu Gly Leu Ser Ala Pro Ser Leu Ser Pro His Cys Cys
                755             760                 765

Pro Cys Arg Ala Arg Leu Ala Phe Arg Asn Leu Gly Ala Leu Leu Pro
            770             775             780

Arg Leu His Gln Leu Cys Cys Arg Met Pro Arg Thr Leu Arg Arg Leu
785                 790                 795                     800

Phe Val Ala Glu Leu Cys Ser Trp Met Ala Leu Met Thr Phe Thr Leu
                805             810                 815

Phe Tyr Thr Asp Phe Val Gly Glu Gly Leu Tyr Gln Gly Val Pro Arg
                820             825                 830

Ala Glu Pro Gly Thr Glu Ala Arg Arg His Tyr Asp Glu Gly Val Arg
                835             840             845

Met Gly Ser Leu Gly Leu Phe Leu Gln Cys Ala Ile Ser Leu Val Phe
        850             855             860

Ser Leu Val Met Asp Arg Leu Val Gln Arg Phe Gly Thr Arg Ala Val
865                 870                 875                     880

Tyr Leu Ala Ser Val Ala Ala Phe Pro Val Ala Ala Gly Ala Thr Cys
                885             890                 895

Leu Ser His Ser Val Ala Val Val Thr Ala Ser Ala Ala Leu Thr Gly
            900             905             910

Phe Thr Phe Ser Ala Leu Gln Ile Leu Pro Tyr Thr Leu Ala Ser Leu
        915             920             925

Tyr His Arg Glu Lys Gln Val Phe Leu Pro Lys Tyr Arg Gly Asp Thr
        930             935             940

Gly Gly Ala Ser Ser Glu Asp Ser Leu Met Thr Ser Phe Leu Pro Gly
945                 950                 955                     960

Pro Lys Pro Gly Ala Pro Phe Pro Asn Gly His Val Gly Ala Gly Gly
                965             970                 975

Ser Gly Leu Leu Pro Pro Pro Ala Leu Cys Gly Ala Ser Ala Cys
            980             985             990

Asp Val Ser Val Arg Val Val Val Gly Glu Pro Thr Glu Ala Arg Val
            995             1000             1005

Val Pro Gly Arg Gly Ile Cys Leu Asp Leu Ala Ile Leu Asp Ser Ala
    1010             1015                 1020

Phe Leu Leu Ser Gln Val Ala Pro Ser Leu Phe Met Gly Ser Ile Val
1025             1030                 1035                 1040
```

```
Gln Leu Ser Gln Ser Val Thr Ala Tyr Met Val Ser Ala Ala Gly Leu
              1045                    1050                    1055

Gly Leu Val Ala Ile Tyr Phe Ala Thr Gln Val Val Phe Asp Lys Ser
              1060                    1065                    1070

Asp Leu Ala Lys Tyr Ser Ala
         1075
```